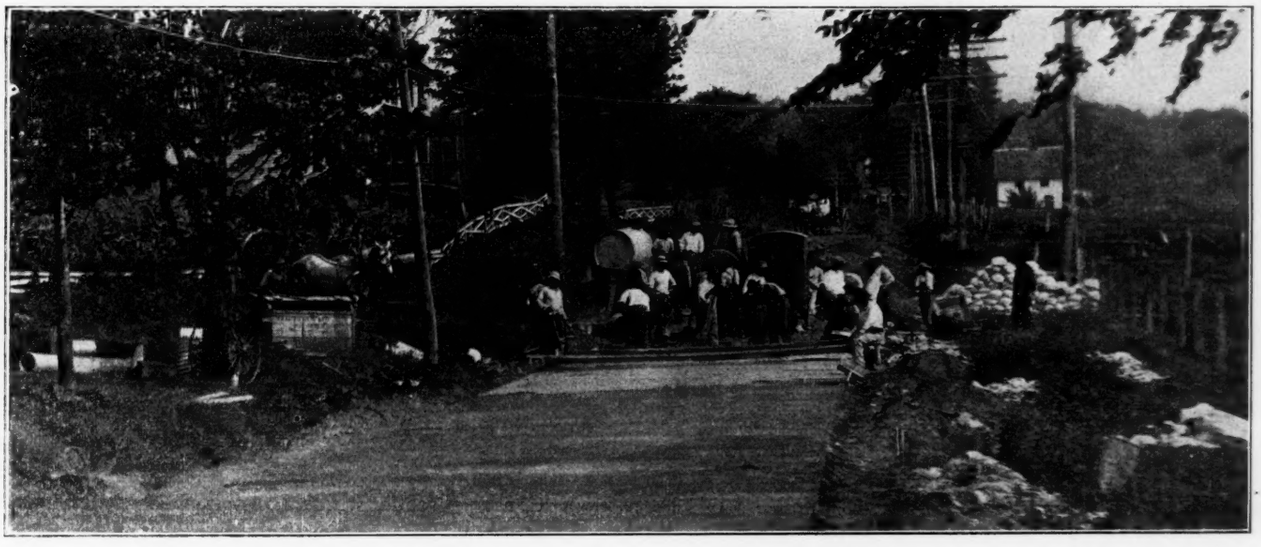
Municipal Journal

Volume XXXVI NEW YORK, FEBRUARY 5, 1914. No. 6



CONSTRUCTING CONCRETE ROAD IN MIDDLETOWN, CONN.

CONNECTICUT STATE HIGHWAYS

Organization of Highway Department—Financial Considerations—Allotment of State Appropriations—Classes of Construction Employed—Dirt, Gravel, Plain and Bituminous Macadam, Bituminous Concrete and Cement Concrete.

By THORNDIKE SAVILLE.

At the head of all the state highway work of Connecticut is an engineer-commissioner appointed for four years by the governor of the state, who has absolute control. The work under the commissioner is divided into three heads, each under an engineer assistant reporting to the commissioner. The first division embraces the clerical work, the accounting and disbursing of appropriations; the second, maintenance and repair of existing highways; the third, construction of new highways or reconstruction of old highways. In this manner the work is simplified and coordinated as much as possible and aims at maximum efficiency with least possible interdepartmental confusion.

At present the force is divided somewhat as follows:

Number of men in the office	26
Supervisors of repair, each in charge of a district	9
Assistant supervisors of repair	4
Division engineers, each in charge of a district in construction work	9
Assistant engineers in construction work	27

This is approximately 75 men employed in charge of various branches of the work in a larger or smaller degree of responsibility. In addition to these men there are several hundred men who are actively employed in the actual work of surveying, oiling, various kinds of repair, etc., of which only an indefinite idea as to actual number could be obtained, and which number varies in accordance with the work to be done and the season of the year.

All work on state highways, both maintenance and construction, is paid for from appropriations of the legislature, each appropriation to cover two succeeding years. These appropriations, usually for $1,000,000 each, are divided into two classes, those for trunk lines and those for state aid roads.

Trunk lines are through routes connecting important centers and carrying traffic of all kinds. The appropriations made under this heading have to be expended on certain specified roads. On these roads the state pays the entire cost and has complete control, although wherever possible the wishes of the town authorities are carried out.

The appropriations for state aid roads are divided equally among the towns applying for aid, in accordance with resolutions passed in town meeting. There are about 168 towns in Connecticut, and usually about 80 per cent of this number apply for aid. The ratio of the number of towns so applying varies somewhat from year to year, and therefore the annual appropriation per town is not constant.

Table I shows the annual appropriations made by the State Highway Commission for state aid roads for a number of years.

In addition to this, the sum of $5,550,000 has been

allotted during the same period for the improvement and maintenance of the trunk line highways. Of this, $3,000,000 ($1,000,000 in the state aid fund and $2,000,000 in the trunk line fund) represent the appropriations available October 1, 1913.

Table I.

1895-96	$450,000
1897-98	400,000
1899-1900	350,000
1901-02	450,000
1903-04	450,000
1905-06	459,000
1907-08	1,000,000
1909-10	1,000,000
1911-12	1,000,000
1913-14	1,000,000
Total	$6,559,000

Table II shows the maximum amount allotted to each town during the above term of years.

Table II.

1895	$2,940
1896	2,850
1897	3,000
1898	3,000
1899-1900	4,500
1901-02	5,200
1903-04	5,670
1905-06	5,250
1907-08	7,872
1909-10	10,000
1911-12	9,000
1913-14	8,000

In distributing these appropriations for the actual construction or improvement of roads, a difference is made according to the tax list of the town. Those towns having a grand list of over $1,250,000 pay for any specific improvement one-fourth of the total cost, the state paying the other three-fourths. Those towns having a grand list under $1,250,000 pay one-eighth of the total cost, the state defraying the remaining seven-eighths.

The money for all these appropriations is obtained by floating state bonds, and comes as a general, and not a specific, disbursement from the state funds.

In determining the type of road for a given place, the method of improvement, or the location (of a new road), the final decision in all cases rests with the state commissioner, who attempts, so far as possible, to reconcile local desires with the general needs.

One feature of the state aid work should be especially noted. When a given town applies for aid under its allotment, the commissioner, as has been stated, adjudges of what type and in what locality the road shall be. This decision is governed largely by local conditions and appropriations available. Thus, in many cases, merely a graded dirt or gravel road is put through (in primary location), or a dirt road replaced with macadam, or perhaps nothing more than a reduction in grades of existing roads attempted, the decision in every case being governed by expediency. Then, at some later date, as conditions warrant and as more funds become available, the early temporary measures are improved, the road is reconstructed, resurfaced, or treated in some way to permanently improve it. This method of treating each separate case according to its individual economic necessities, as well as its relation to the whole coordinated system, should theoretically—and does actually in the majority of cases—make for a high degree of efficiency.

The classes of road construction adopted by the state of Connecticut are essentially as follows:

(1) Graded road with a 6-inch hardening course. This is the kind of road built to obtain maximum grade reduction or curve elimination, and not for inherent quality of road. The hardening material is gravel or hardpan and is rolled with an ordinary farm roller.

(2) Gravel road, three courses, 3-inch, 3-inch and 2-inch, a total thickness of 8 inches. Specifications call for different sizes of gravel. Each course to be sprinkled and rolled. This type of road is subject to many modifications, and is best for light traffic of farm vehicles with little automobile use. It binds well, although softening in the spring, and is repaired at very little cost. In many instances it is to be preferred to macadam when good gravel is obtainable.

(3) Water-bound macadam, used for heavier teaming with a moderate automobile traffic. The surface, however, quickly disintegrates under high speed auto traffic when not treated with a bituminous binder. Macadam roads are built with a 4-inch bottom course of broken stone filled with sand, a 3-inch intermediate course and a finishing course of screenings.

(4) Penetrated bituminous macadam. This type is built in many different ways, each road requiring different treatment. In general, there is a 4-inch bottom course, sand filled and penetrated with three-quarters of a gallon of tar (or asphalt) per square yard, a second course with a similar coating of one and one-half gallons of tar or asphalt and then a seal coat of one-half gallon per square yard.

(5) Bituminous concrete, including the patented processes of Warrenite, Amiezite and the Topeka type. The construction and use of these roads are more fully discussed in the text following.

(6) Tar-bound macadam, a road construction tried in various places but not with uniform success. It is difficult to mix, cools rapidly, "bleeds" and waves down hill.

(7) Concrete roads, which are described in detail in the text following.

Perhaps the best method of indicating the work now being done by the State Highway Commission of Connecticut is to discuss in detail the several kinds of roads observed on the two trips taken by the writer with the commissioner and his assistants. On these two trips a total of some 150 miles of road was covered, and representative phases of the condition of state roads —good, bad and indifferent—observed, as well as the methods of repair and maintenance.

Starting from Hartford, the route of the first trip was over the Albany turnpike, the trunk line between various central New York cities and Hartford. Beginning at the city line, a piece of Topeka roadway about two miles long had just been laid. So far as observed, this presents a very admirable surface for the almost exclusive auto traffic to which it is subject. What teaming there is is light, mostly farm produce.

Further out from the city there is three or four miles of the turnpike which crosses a high ridge, with many curves and steep grades, the latter as high as 10 per cent. Early in the year this portion was laid down with water-bound macadam. It is subjected to a very considerable automobile traffic, as well as being used by many horse-drawn vehicles, and very soon began to show signs of wear. With the first rains the surfacing began to ravel, and now, in order to keep the road in any kind of shape, a constant and abundant surfacing with liquid asphalt is necessary. This tends to make the road slippery on the steep grades, but seems all that can be done at present. The writer was much interested to learn that those in charge were of the opinion that the best kind of road for such conditions would be a common graded earth road, which is cheap in first cost and economically kept in repair by constant grading.

As the distance from the large centers such as Hartford increases, the roads are of less pretentious character. Many of the main roads are of dirt, very poorly drained, and badly rutted owing to heavy traffic of all

kinds. These roads are being improved as rapidly as appropriations become available. In the less thickly populated regions the roads are of native material—gravel, loam, sand, hardpan, etc.—and in most cases answer sufficiently for the traffic to which they are subjected.

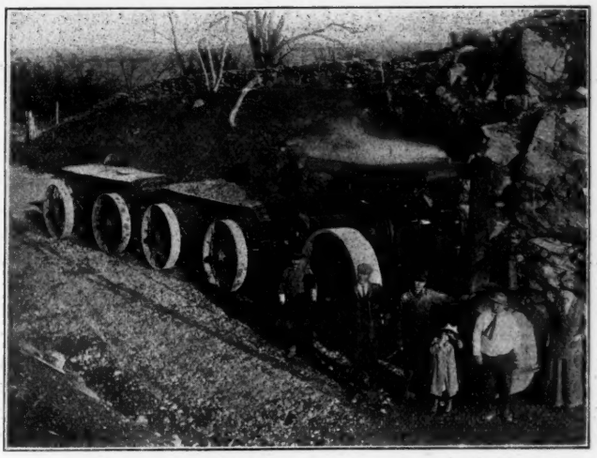
Between Unionville and Collinsville there is a stretch of tar-bound macadam (penetration process) with a flush coat of asphalt, which has just been put down, and which seems excellent. Between Farmington and West Hartford (about five miles) there is an almost continuous pavement of Warrenite, laid in the majority of cases on macadam. In general, this surfacing seems the most satisfactory for trunk lines subject to heavy automobile and comparatively light horse traffic. In several places where previous roads have not stood up well, owing to a springy sub-soil, the difficulty has been solved by laying Warrenite on a concrete base between concrete curbs. The street car companies on this road use Amiesite between the tracks and in bonding to the Warrenite on the roadway.

On the second trip the first road of interest was a stretch of concrete about two miles long, being constructed on the trunk line between Hartford and Windsor. The mixture was 1:2:4, the stone being of two sizes to insure as close and homogeneous an aggregate as possible. In general, three parts of ½-inch to one part of 1½-inch stone is used. The concrete is placed 5 inches thick on the sides and 7 inches at the center, the crown being thus secured by varying the thickness of the concrete. The concrete is brought to surface by means of an iron-shod template drawn along scantlings which are set at each side carefully to grade. Baker expansion joints are used every 25 feet. The concrete is mixed in a portable batch mixer, which is arranged to mix either concrete or bituminous matter. The shoulders are of stone, usually the macadam from the old road, and are 5 feet wide.

The concrete is laid on the old macadam road, after it has been properly cleaned and scraped. Concrete was selected in this specific locality because the subgrade is a very spongy red clay, and all the other road surfacings tried work into the clay after very little travel, while concrete has been found from other experiments to be the only material to stand up well on such a poor foundation. On curves the crown is changed by an intermediate section so as to slope or drain entirely in one direction, i. e., to the inside of the curve. The cost of the concrete in place is about $1.50 per square yard.

Adjoining this road toward Hartford is two miles of bituminous macadam on a telford foundation. The telford foundation (the road was formerly of that character) in Connecticut is very carefully made of placed rock, and cost from 80 cents to $1.00 per linear foot, or 60 cents a square yard. From this somewhat excessive cost it can be seen that such roads are of generally better construction than the average of the type. The bituminous material with which the road is surfaced at present was mixed in a machine similar to a batch concrete mixer, with a pressure oil feed for heating the ingredients. The stone is put in first and the flame from the heater allowed to play over it and heat it thoroughly while it is mixing. The flame is then shut off, hot asphalt poured over the stone and the mixing continued, but without additional heat. The mixed product is then laid as usual on the road and rolled.

USE OF TRACTOR ON A LONG HAUL.



HAULING GRAVEL WITH ROAD ROLLER.

On this same trunk line, near Windsor, is a considerable stretch of road surfaced with Amiesite. On all roads like this, made of patent surfacings (Warrenite, Amiesite, etc.), a five-year guarantee is required from the contractor.

By far the greatest mileage of trunk lines throughout the state are of water-bound macadam treated with a cold application of asphalt, either Trinidad A or Standard No. 4 asphaltic oil. In every instance the surface was covered with sand immediately after the application of the oil. The cost averages 10 cents per square yard for the treatment over the state taken as a whole. The oil (or asphalt) costs in the neighborhood of 7 cents a gallon delivered on the side track, and the covering from 15 cents to $1.00 a load, depending upon the locality and the availability of materials.

A small amount of road has been treated with a hot binder applied under pressure, the cost varying from 15 to 20 cents per square yard. All kinds of bituminous materials have been used, many under pressure applications, but thus far generally on test pieces of road only.

Water-bound macadam roads treated in either of the above ways are patched by hand sprinkling from cans, brushing in with brooms and covering with screenings or ½-inch stone. These surfacings have been used under many varying conditions, and give about the cheapest and most satisfactory surface for ordinary traffic.

In Manchester an excellent road is being constructed, utilizing the deposits of coarse red gravel existing there, in combination with 2-inch trap rock. The foundation is prepared as for a macadam road, gravel being laid in 2-inch and 3-inch courses, each being well rolled and watered. A layer of trap is then put on the surface, rolled to a thickness of one inch, and the whole then covered with ¾-inch screenings for a wearing surface and treated with Trinidad A or B. The resulting road may be called a gravel macadam and furnishes an excellent and economical pavement for the traffic of a medium-sized manufacturing town. In many cases the top course of trap is omitted, the gravel being rolled in courses and graded to a finished surface.

NEED OF TRAFFIC RECORDS*

Uniform Method of Taking Counts—Annual Cost of Maintenance—Cost Per Ton Per Mile—Figures from English Records.

By COL. W. D. SOHIER.†

Before deciding upon any particular surface or pavement for any special road or street, if we are to decide correctly, it is absolutely necessary that we should know exactly what traffic, and particularly the kind of traffic, that the road must carry; not only the present traffic but the future traffic as well.

We found in Massachusetts that in three years, from 1909 to 1912, the traffic on our state highways had often doubled. Its character also had changed. Some roads had more heavy teaming, most of them had less; but motor trucks had replaced the teams, carrying actually more tons per day. Automobile traffic had more than doubled, and what were formerly little country roads, with but twenty to fifty teams a day, now had become interurban and interstate thoroughfares, carrying from 300 to 700 automobiles a day in the season.

Uniform Traffic Statistics Needed.—What we need is some uniform method of taking traffic counts, and some uniform formula that will fairly represent the weight or damage done by the different kinds of traffic, based upon the weight per yard width per year, or per day, so that we can compare results. After a series of years we should then be able to more accurately determine the surface or pavement that would best meet all the necessary requirements. Traffic statistics have been made for many years in certain places in England and on the Continent. The English Road Board has adopted an assumed weight for various vehicles, and many traffic statistics based upon this formula have been made and are now available in various reports. We could well adopt the same formula, based upon American tons, so that we could compare our results with theirs upon a uniform basis.

Table I.—English Traffic Formula Weights.

		Assumed weight of vehicles (tons).
Motor vehicles.	Runabouts	1.43
	Touring cars	2.23
	Trucks	6.25
Horse-drawn vehicles.	one horse, light vehicles	.36
	one horse, heavy vehicles	1.12
	two or more horses, light vehicles	.54
	two or more horses, heavy vehicles	2.46

The number and class of vehicles having been determined, the traffic per yard width of roadway can be calculated.

Wear, Annual Cost of Maintenance, etc.—Mr. Brodie, City Engineer of Liverpool, has made some very accurate studies extending over a period of ten years, covering the weight of traffic per yard width per year, the life of the road, life tonnage per yard width, cost per yard, per ton, etc.

His table, which I give herewith, can be studied with great advantage. (Table II.)

You will note that the average cost of maintenance, including capital charges, varies from 7 cents for certain granite setts to 25 cents per square yard per year for certain wood blocks. (7 cents for pitch macadam and 4-inch granite setts.) The pitch macadam was practically a trap rock macadam where large stones were used, grouted with a mixture of hot sand and pitch, equal volume, till it flushed, and then smaller stones were rolled in and a surface coat and grits applied on top, and rolled in. One such road is now eleven years old, has not yet been repaired, and has carried a traffic of 120,000 tons per yard width per year. On the average state highway in Massachusetts, with 15 feet in width of macadam, this would mean 600 to 700 vehicles a day; not, of course, on a real heavy teaming street, but average traffic.

Cost per Ton per Mile.—These figures do not really, however, tell the story of the actual cost but the cost per ton per mile shows better what duty the road has performed. The wood block carried less than 7½ tons per yard width for each penny expended; the pitch macadam carried over 20 tons, and 6-inch granite setts on a concrete base carried 34 tons. Water-bound macadam carried only 7.6 tons, but if it was tar-sprayed it carried nearly 11½ tons for each penny expended.

Another way of stating the same result is the expenditure for maintenance for each ton transported one mile. This cost varied from under .06 cent per ton on 6-inch granite setts to about .27 cent for hardwood block and water-bound macadam, while tar-sprayed macadam cost .18 cent, or only two-thirds as much as water-bound, and pitch macadam cost only .095 cent, or about one-half of the cost of the tar-painted macadam.

Any engineer will find himself amply repaid if he makes a careful study of the traffic statistics and costs which are set forth in many of the papers, both French and English, presented at the International Road Congress, and in the reports of the English Road Board.

Note also that the kind of traffic which has to be carried makes the most difference of all. Every road surface must be strong enough not to be crushed or broken through by any vehicle that goes over it. On the Liverpool paved streets, near the docks, 30 tons on four wheels is not an unusual load. Traction engines on iron tires, weighing 12 tons with their load, are common, as are also two or three trailers, weighing, with load, 8 tons each. Both surface and foundation must be strong enough to bear up every vehicle, without any appreciable rutting or breaking, or the road will be rapidly destroyed.

The cost on different roads in England is given in a

*Paper before the American Road Builders' Association.
†Chairman of the Massachusetts Highway Commission.

Table II.—Giving Particulars of Experience Obtained n Liverpool with Different Classes of Surface Pavement.

Pavement.	*Tons per yard width per annum.	Life, years.	Life tonnage per yard width.	Cost per square yard of surface.	†Annual cost per square yard.	Ton-miles per yard width per penny.	Cost per traffic ton-mile, cents.
6-inch setts	524,000	18	9,432,000	$2.50	$0.170	34.0	0.058
4-inch setts	150,000	50 (Estimated.)	7,500,000	1.87	.070	24.0	.080
Hard wood	162,000	17	2,754,000	3.37	.250	7.4	.272
Soft wood	204,000	18	3,672,000	2.12	.115	15.5	.128
4-inch pitch macadam	120,000	11	1,320,000	.75	.066	20.6	.096
7-inch water-bound macadam	120,000	1	120,000	.02	.180	7.6	.264
7-inch water-bound macadam, tar-sprayed.	120,000	2	240,000	.25	.112	11.4	.180

NOTE: Tonnages on Road Board basis, except that which, being exceptionally heavy traffic, is based on estimated total actual weights.
*English ton, 2,240 pounds.
†Including proportion of capital and maintenance.

table published in connection with the International Road Congress, pamphlet No. 88, report of Messrs. H. T. Wakeham, A. Dryland, Col. R. E. Crompton, C. B., and T. W. A. Hayward. This table of costs is for water-bound macadam roads and a very few tar-sprayed roads. (Table III.)

You will note that there are tremendous variations in cost. On some of these roads the maintenance cost is as low as .14 cents per ton per mile, and on others as high as 1.42 cents. Evidently much further study is necessary to show not only the reason but the remedy for some excessively high costs. I have shown two of our state highways merely for the purposes of comparison, and you will note that the cost of water-bound macadam roads is about the average. Where it costs more it becomes evident from looking over the Liverpool statistics that the pavement is entirely inadequate to carry the loads which are going over it.

These statistics, varying as they do, show the absolute necessity for accurate traffic data as a prerequisite to the selection of a road surface or pavement.

In some of the reports of the French engineers many costs are given that are of much value for traffic here. For instance, the Avenue du Bois de Boulogne, in Paris, was maintained as water-bound macadam until 1906. It had to be renewed every three years. The annual cost for maintenance was about 39 cents per square yard per year. In September, 1906, it was tarred, and the annual cost of maintenance has fallen to about 25 cents a yard a year, or about two-thirds. It must be remembered that this is a very wide avenue with a tremendous traffic in automobiles and pleasure vehicles, but with little or no teaming.

Asphalts and asphaltic residuums have been but little used in England or France, probably because the tar products are much cheaper, so that it remains for us in this country to keep accurate data and costs, figured on a uniform basis, to determine in each locality what is the best and most economical material that can be used on that particular road to adequately carry the traffic which will pass over it.

NIAGARA FALLS ASPHALT REPAIR PLANT.

In May, 1912, the Board of Public Works of Niagara Falls, N. Y., purchased a Smith hot mixer for use in making repairs to asphalt pavements, which was described in our issue of December 19, 1912. The report of the work of this plant for 1913 has been submitted by City Engineer F. S. Parkhurst. Work began on April 22, 1913, with the overhauling of the plant, and on May 2 the first wearing surface was laid, the work continuing until September 27, during which time it was in operation for 97 actual working days. During this time there was turned out a total of 3,088 batches of topping, an average of 32 batches per working day, which contained 35,512 cubic feet by actual measurement, and which laid 17,363.69 square yards of topping with an average thickness of 2¾ inches. In addition, 168 batches of binder were turned out, containing 1,932 cubic feet, which was used in laying 1,008 square yards with an average thickness of 2 9/16 inches. In addition to this the force repaired 2,397 square yards of concrete base, 6 inches thick, equivalent to 399.4 cubic yards of concrete. Of the amount of topping given above, 2,472 square yards was for repairs to cuts made by plumbers and public service corporations, for which $3,228 was received by the board.

The labor employed during 1913 comprised an engineer at $5 a day, foreman at $3.50, 2 machine tenders at $2.50, and 2 asphalt laborers at $2, these being all at the plant. On the street there were employed a superintendent at $6, 2 rakers at $3.50, 1 smoother at $3.25, 1 tamper at $2.75, and a timekeeper at $3.50; also 4 choppers, 2 rollermen, 1 painter and 6 cleaning-up men at $2 per day and 2 teams at $6.30 per day. The average number of men employed on the work was 25; average number of teams, 2, and the average daily payroll was $78.60.

Of the total cost of asphalt topping and binder of $13,034, $1,500 was for the asphaltic cement, $1,633 for plant and tools, $680 for plant depreciation, $751 for coal and wood, $1,419 for teaming, and $6,397 for labor, the balance being for sand and gravel, cement and ground limestone.

The total cost per square yard was 71.22 cents for top-

Table III.—Showing Weight of Traffic in Tons Carried One Mile for One Penny of Maintenance Cost.

County.	Place.	Weight of traffic in tons. Per day.	Weight of traffic in tons. Per annum.	Average cost per mile per annum.	Weight in tons carried 1 mile for 1 penny.	Cost of maintenance in pence per traffic ton-mile. (Penny.)	Cost of maintenance in pence per traffic ton-mile. (Cts.)
Norfolk	Weybourne	39	14,200	£41.5s	1.4	0.71	1.42
Norfolk	Edgefield	96	35,000	16	9.0	.11	.22
Warwick	Gaydon Cross Road	185	67,500	86	3.2	.31	.62
Warwick	Wooton Waven	239	87,200	127	2.9	.34	.68
Warwick	The Asps	242	88,300	86	4.3	.230	.46
Kent	*Near Charing	348	126,700	299	1.7	.590	1.18
Norfolk	Framlingham	359	131,000	73 5	7.4	.130	.26
Norfolk	Lyn-Ely	385	140,500	56 5	10.4	.096	.192
Norfolk	Diss	390	142,300	55	10.7	.093	.186
Warwick	Haselor Bar	451	164,600	127	5.4	.18	.36
Norfolk	East Carleton	504	184,000	50 5	15.1	.066	.132
Kent	Road No. 20	528	192,100	348	2.2	.45	.90
Warwick	Willenhall	609	222,000	269	3.4	.29	.58
Warwick	Elmdon	734	268,000	419	2.7	.37	.74
Warwick	Styvechale	736	268,600	134	7.9	.127	.254
Kent	*Road No. 91	796	289,800	192	6.3	.16	.32
East Sussex	Roedean	984	359,000	333	4.4	.22	.44
Norfolk	Diss	1.057	386,000	218	7.3	.13	.26
Kent	Sidcup	3 030	1,102,810	2,100	2.1	.47	.94
Kent	*Sidcup	3,030	1,102,810	1,792	2.5	.40	.80
Surrey	Putney	5.694	2,078,300	1,032	8.4	.12	.24
Surrey	*Putney	5,694	2,078,300	604	14.3	.07	.14
Average of Norfolk roads		9,023	3,300,000	2,298	6.0	.16	.32
Average of Warwickshire roads		9,777	3,569,000	3,965	3.7	.27	.54
Comparison with Two Massachusetts Roads.							
*Beverly		2,898	1,058,430	$3,257	6.50	.185	.37
*Weston		1,920	699,924	1,993	7.02	.14	.28

*NOTE: Surface tarred.

*Period of 14 years.

ping and 65.91 cents for binder; or 34.83 cents per cubic foot for topping and 34.39 cents per cubic foot for binder. In determining the amounts spent for topping and binder, a 40 per cent depreciation of plant and tools was charged against the same, being divided between the two in proportion to the square yards laid. From 1907 to 1911, inclusive, the asphalt pavements were repaired by contract at an average cost of $1.34 per square yard. During 1912 the cost by the municipal plant was 77 cents and during 1913 was 71 cents.

The asphaltic cement was obtained by contract which was awarded to the lowest of eight bids received on April 1, $20 a ton f. o. b. Niagara Falls being paid. Concerning the purchase of asphaltic cement, Mr. Parkhurst says, "We suggest that in the future asphaltic cement be purchased without bids. Some difficulty was experienced with the first consignment of asphaltic cement received this year, due to the fact that the manufacturers were not thoroughly conversant with the climatic and traffic conditions at Niagara Falls, which fact cannot be stated in the specifications and is simply gained by experience of asphaltic cement manufacturers. When material is purchased by a competitive bid, the city is compelled to purchase from the low bidder, when it may be advisable to purchase that which is not lowest in price."

Early in August it was deemed advisable to place the plant in a permanent location, and it was hauled to a small tract of land owned by the city and advantage taken of the permanent location to make some changes in the operation. To increase its capacity there was constructed a brick oven, from which the flame or hot blast was passed into the mixing drum. Formerly the hot blast was obtained from the fire under the boiler which operated the drum, but it did not then seem possible to obtain sufficient steam to run the plant to its full capacity. After constructing the brick oven, the capacity of the plant was increased. The mixer has been operated two years very satisfactorily, and a considerable part of the time to its maximum capacity, but repairs are becoming more frequent, and it is believed by the engineer that by the end of the season of 1914 it will be practically worthless, and he recommends that provision be made for the purchase early in 1915 of a permanent plant at a cost not to exceed $5,000.

CRACKING IN CONCRETE ROADS.

Probably more criticism of concrete pavements is centered on the cracks which occur and expansion joints than upon any other feature of this kind of construction. A. N. Johnson, state highway engineer of Illinois, in a paper before the American Road Congress last fall attributed the formation of cracks to unequal settlements of the subgrade, supplemented by external stress due to the passage of heavy traffic or to the movement of the slab under temperature changes. In commenting upon this, Henry S. Spackman refers to experiments conducted by him which showed that when concrete is mixed as wet as it generally is in modern road work it shrinks during the first twenty-four hours and then expands during the next three or four months, the shrinkage being undoubtedly due to a draining out of the water and the expansion to the continuation of the chemical action, which continues for months and even for years in a continually lessening degree. In view of this shrinking which begins almost as soon as the concrete is laid, it seemed impossible to prevent the cracking of the pavements unless the exudation could be prevented. Mr. Spackman has experimented with the addition of hydrated lime for this purpose, and compared 18 test pieces to which hydrated lime had been added to the extent of 10 per cent of the amount of cement in some instances and 20 per cent in others, and 9 test pieces containing no lime. During the first twenty-four hours the average contraction for those containing hydrated lime was .007 per cent, as against .015 per cent for the pieces containing no hydrated lime. At his suggestion also the Office of Public Roads laid a short stretch of road at Chevy Chase, Washington, D. C., using hydrated lime, and another was laid near Salisbury, Md. These experiments all lead him to believe that the addition of 10 to 15 per cent of hydrated lime will be found beneficial not only in reducing cracks, but also in eliminating the formation of holes and soft spots. Such addition, he says, not only causes the mortar to hold the water, but the more plastic and viscous mortar eliminates the segregation of the cement from the sand and secures a more homogeneous mixture, lessening the liability of pockets of material deficient in cement.

ST. LOUIS PAVEMENT REPAIRING

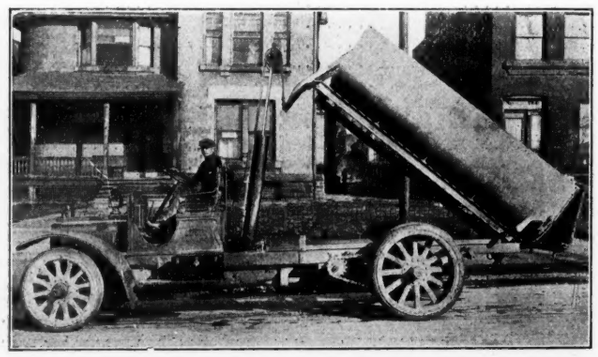
New Truck for Carrying Hot Asphalt—Plant Inspection of Contract Work with One Year Maintenance —Use of Burners.

By HARRY M. CRUTCHER.

During the summer of 1913 the St. Louis Street Department purchased a second automobile asphalt truck, which is thought to be an improvement in some respects over the one in use for a year previous. The new machine is a Saurer truck and was delivered equipped with a dumping device and a body with a capacity sufficient to carry five tons of asphalt from the municipal asphalt plant to the various repair gangs in the city. The body is constructed of two steel shells separated by a layer of asbestos to prevent heat loss in transit. A Woods Company hydraulic hoist, controlled from the driving seat, is used in dumping the load.

The machine was purchased last summer and, according to Frank Arnold, superintendent of the municipal garage, the truck has, up to date, required no repairs whatsoever. Inasmuch as the truck is not equipped with an odometer, its mileage can only be approximated. Mr. Arnold figures the mileage from the day the truck was put in service, September 22, 1913, to December 1, 1913, to be almost 1,800 miles. During this period there were used 356 gallons of gasoline, at an average cost of 18 cents per gallon; 127 pints of lubricating oil, at 4½ cents per pint, and five pounds of cup grease, at 6½ cents per pound.

The maintenance of all bituminous pavements, the operation of the municipal asphalt plant, the plant and street inspection of asphalt streets to be laid under the city's new specifications, and the oiling of the city's highways, all are under the supervision of W. L. Hempel-



HOT ASPHALT TRUCK, ST. LOUIS STREET DEPARTMENT.

mann, engineer of maintenance of bituminous pavements. This office was created in June, 1912.

The actual maintenance of the asphalt and bitulithic pavements devolves upon the city only after the expiration of a guarantee period. During the maintenance period the contractors are given notice when the repairs are necessary on any of their contracts, and these repairs are made under the supervision of the Street Department.

Mr. Hempelmann reports that on January 1, 1913, the department had under its maintenance approximately 941,000 square yards of bituminous pavements. The yardage, up to 1917, is distributed as follows.

	Asphalt. Sq. Yds.	Bitulithic. Sq. Yds.
Expired in 1909	21,495	.....
Expired in 1910	.....	141,156
Expired in 1911	123,811	232,930
Expired in 1912	225,758	195,831
Expired in 1913	285,709	96,829
Expire in 1914	335,938	109,676
Expire in 1915	413,064	89,921
Expire in 1916	121,534	80,067
Expire in 1917	86,624	45,842

During the fiscal year 1913-14 many of the asphalt pavements have been laid under the city's new specifications, which provide for only one year's maintenance and for plant inspection. Previously, under five, seven or ten year maintenance contracts, no provision was made for the inspection at the contractor's plant. It was assumed that in case the material should fail after being laid the contractor would be required to do the necessary repair work.

Regarding the old contracts Mr. Hempelman says:

Proper maintenance under these contracts has been very unsatisfactory because of a difference of opinion between the department and the contractor as to what should or should not be repaired.

From the previous table it will be seen that on January 1, 1916, we will have approximately 2,280,000 square yards of bituminous pavements under our maintenance. Assuming fifteen years as the average life of bituminous pavements under our traffic and climatic conditions, provision should be made in the next two years for adequate funds and equipment necessary to resurface from ten to fifteen per cent of this area per year, as well as to properly keep in repair the remaining yardage.

Mr. Hempelmann believes that resurfacing badly "waved" or "pushed" bituminous pavements by means of burners is not economical. Concerning this he says:

Where the sheet pavement actually moves on the concrete foundation, resurfacing by the use of burners and additional material has not been found satisfactory, this method producing only temporary results. In such cases the old pavement should be taken up and relaid with "binder and top."

In the fall of the year we find it economical to seal, by means of a flush coat and a covering of sand, some of the bituminous pavements. This seal coat tends to keep the moisture out of the pavement and also takes the wear that would normally come upon the pavement proper.

WASHINGTON ASPHALT PLANT.

Washington, D. C. (District of Columbia), operates a portable asphalt plant, the cost of which was $5,000; and a street repair equipment which is used in minor repair work represents an additional investment of $1,900. This plant has been used in making minor repairs to asphalt pavements since the first of November, 1912. During the eight months prior to the annual report for the year ending July 1, 1913, the total output of this plant was 103,145 cubic feet, which is at the rate of about 150,000 cubic feet per annum. The labor cost for operating the plant, including the haul of the product and overhead charges, was 26 cents per cubic foot; this not including the cost of material. The cost of the material for the top mixture turned out at the plant averaged 22.7 cents per cubic foot, which, added to the manufacturing costs, gives a total cost of 48.7 cents, laid on the street, as against the contract price for this work of 57 cents. The cost of the material for the binder mixture was 14.1 cents, which, added to the manufacturing cost, gives a total cost laid on the street of 40.1 cents, as against the contract price of 43 cents per cubic foot. The elements of rental value of the site of the plant, taxes and contractor's profits are not included in these costs.

The commissioners state in their report that the operation of this plant has demonstrated its economy, but that a larger permanent plant would permit still more economical operation, and the securing of such a plant is recommended.

All work of repairing asphalt pavements, except where the roadway is entirely resurfaced, is done directly by the district instead of by contract; resurfacing, however, being done by contract. The commissioners also have the authority to use this plant in repairing macadam streets by placing an asphaltic macadam wearing surface upon them; also in constructing asphaltic macadam wearing surface on a concrete base when this work can be economically performed by the use of the plant.

LIGHT FLOORS FOR HIGHWAY BRIDGES

Wood Block, Bituminous Wearing Surface and Plank to Meet Various Conditions of Traffic.

The Illinois State Highway Commission, in its annual report, gives some suggestions concerning floors for steel highway bridges which would seem to answer a problem of more or less general occurrence if we may judge by inquiries received. The discussion, somewhat abridged, is as follows:

The largest item of expense in connection with the upkeep of steel bridges not having concrete or other permanent floors, is that of floor maintenance. Until a few years ago, the floor almost universally specified for country highway bridges consisted of white or burr oak plank, from 2½ to 3 inches in thickness. When first-class material could be obtained at a cost of $25 per thousand feet board measure, such floors proved to be fairly economical if not subjected to heavy traffic. But now it is almost impossible to obtain at any price a good quality of white or burr oak bridge plank.

The lightest concrete floor that can be designed to carry modern traffic with safety weighs 40 pounds or more per square foot, and in order to protect such a floor from excessive wear and to distribute concentrated loads sufficiently so that they will not produce local failure, a wearing surface of gravel, macadam or brick weighing a minimum of 50 pounds per square foot is necessary.

Steel bridges carrying plank floors are rarely, if ever, designed to carry more than the dead weight of the bridge itself, which includes about 12 pounds per square foot for the floor, and a live load of 100 pounds per square foot, provided by law.

To place a concrete floor on a steel bridge, designed to carry a plank floor, would impose, therefore, an additional dead load on the structure amounting to the difference between 90 pounds per square foot, the weight of the concrete floor and wearing surface, and 12 pounds per square foot, the weight of a plank floor, or about 78 pounds per square foot.

The proposed floor must weigh but little more than the floor for which the structure was designed; it must

not be unduly expensive, and it must be as durable as possible.

The material which best meets these requirements seems to be timber treated with creosote oil to prevent decay. All woods treated with creosote oil seem to resist decay equally well. Any wood may therefore be used which is susceptible to the creosote treatment and which will resist the wear coming upon it.

For existing wood floor steel bridges, located in or near cities, which carry a considerable amount of traffic, it is recommended that a creosote wood block pavement be laid on creosoted pine sub-plank. Such a floor weighs about 30 pounds per square foot. This is about 18 pounds per square foot in excess of the floor weight a majority of wood floor steel bridges are designed to carry. However, as this type of floor is very much smoother and stiffer than the ordinary plank floor, the reduction of vibration due to heavy moving loads is greatly decreased. This is a factor of safety which will balance somewhat the greater dead weight of the structure. However, a careful investigation of the strength of the bridge should be made before a floor of this character is laid.

At present prices for material this type of floor can be laid for about four times the cost of a 3-inch plank floor. If proper materials and workmanship are used, there is little question but that such a floor will last 12 years or more, possibly 25 or 30 years.

For existing bridges in good condition and of proper design, located on roads at some distance from a city, carrying a moderate amount of traffic, a floor consisting of 3-inch creosoted sub-plank on which is placed a wearing surface about three-quarters of an inch thick of fine gravel or stone chips flushed with heavy asphaltic filler will be found serviceable and economical. Such a floor, if properly constructed, will present a smooth, elastic surface which will reduce vibration. A floor of this character weighs but a few pounds per square foot more than a 3-inch oak plank floor and is far more durable. The wearing surface will probably require renewal at intervals of from 2 to 6 years, depending upon traffic conditions. As the wearing surface may readily be renewed by day labor, at a cost of about 50 cents per square yard, the item of maintenance is small compared with the cost of maintaining an untreated plank floor. There is no reason why a floor of this character should not last as long as a creosoted block floor, providing the sub-plank is kept protected from wear by a properly maintained wearing surface.

For existing country highway bridges, in good repair and of sufficient strength, where traffic is light and little wear comes upon the floor, creosoted oak plank with no special wearing surface can often be used. Red oak can be used to advantage for this purpose, as it is readily susceptible to treatment with creosote oil, wears less than a softer wood and will probably last as long as far as decay is concerned as any other creosoted timber.

In this connection it is worthy to note that the rate of wear on an ordinary plank floor greatly increases with the age of the plank, owing to the softening of the wood as decay advances. As the creosote treatment protects the plank from decay, a floor of this character will wear better than a floor of untreated material, as the wood remains hard and resistant until decay sets in.

In the light of the above discussion it is therefore well to hold in mind the following points:

1. Old steel bridges are rarely, if ever, strong enough to carry with safety a concrete floor.

2. For existing steel bridges in good condition and of satisfactory design, located in cities or elsewhere where traffic is heavy and ordinary plank floors rapidly wear out, it will be found economical to refloor with creosoted sub-plank and creosoted blocks.

3. For existing steel bridges in good repair and of satisfactory design, carrying moderate traffic, but yet where wear is of considerable importance, it will be found economical to use creosoted plank with a bituminous wearing surface.

4. For existing steel bridges in locations where an ordinary plank floor rots rather than wears out, a creosoted plank floor with no special wearing surface will be found economical.

If a proper selection of floor is made, and the material used is subjected to rigid specifications and inspection, this floor should in most cases outlast the steel bridge on which it is placed.

BITUMINOUS ROAD MATERIALS

Report of Committee of American Society of Civil Engineers—Traffic Census—Construction Materials and Methods—Maintenance.

A special committee of the American Society of Civil Engineers on Bituminous Materials for Road Construction presented, at the annual meeting of that society, a progress report for 1913 which contained a number of conclusions in addition to those presented in previous reports. These conclusions were as follows:

General.—The committee deplores the tendency, apparent in some quarters, to devote time and energy for the discovery of "The Most Satisfactory Road Surface," and expresses its conviction that there is no such thing as a "Panacea" for all highway ills. It believes that, with the development of highway work, it should be constantly more apparent that one of the greatest problems to be solved by highway engineers is the proper selection of the particular material and form of construction to be used, which most efficiently meet the conditions of any particular case, and that progress will be hastened by complete recognition of this fact.

Census of Traffic.—Where motor traffic forms a considerable proportion of the total traffic likely to use a highway, the unit width of traffic lines should be considered as 9 or 10 ft., instead of 7 or 8 ft. as heretofore, because of the greater clearance required for the safe passing of the units of such traffic.

In view of the recent constant and rapid increase of traffic on the highways, it will be in the interests of economy for designs of highways to be made with proper consideration of further increases.

Construction—General.—Within certain limits of traffic, the proper use of bituminous material should effect economy in the expenditures for the cleaning and maintenance.

The proper treatment of a broken stone, gravel, shell or slag road with bituminous material for the purpose of eliminating the so-called dust nuisance will at the same time render even the best of such roads more efficient for sustaining traffic, and such treatment with bituminous materials is usually preferable and more economical than sprinkling with water, or the use of hygroscopic salts.

An objectionable slipperiness of bituminous pavements or bituminous surfaces may be decreased or prevented by proper precautions during construction or by proper treatment thereafter.

Construction.—Materials.—Where bituminous pavements are laid, the edges should be protected and a sudden transition from the pavement to any softer shoulder material avoided by means of cement concrete or other edgings and such reinforcement of the shoulder material as may be necessary.

The character of the stone to be used may influence the choice of the bituminous material.

By proper selection and use of the bituminous material, injury to property and deleterious effects upon animal and vegetable life may be avoided, and also considerable hygienic advantages may result from the use of such material on the highways.

Construction.—Methods.—The main principles underlying perfection in water bound roads remain in full force when such roads are treated with bituminous material.

In all uses of bituminous materials in highway work, the use of proper machinery is preferable, wherever conditions

make such practicable in any part of the process, to the use of hand labor.

Construction—Mixing Methods.—Where the character of the traffic justifies the use of a bituminous concrete pavement, the same conditions demand an extraordinarily strong foundation therefor.

The amount of bituminous material to be used in any case will depend upon the peculiar conditions of that case, such as the kind of road metal and of bituminous material, the character of the aggregate, the climatic conditions, etc.

The character of the mineral aggregate to be used may be controlled by local conditions, but the best results can only be obtained by the use of the best materials. Excessive sizes, or excessive variations in the size of the mineral particles, should be avoided, and the utmost care must be taken to avoid the segregation of the different size particles.

Mixing machines should be used, and hand mixing methods should be avoided wherever practicable.

The success of results is greatly dependent on the degree of uniformity obtained in spreading the mixture and upon the proper rolling and compacting of the mixtue. Too heavy a roller should not be used.

Care should be taken in prescribing or laying any seal coat that invitation or excuse is not given for inferior prior work and its concealment by such a seal coat.

The use of fine sand on top of bituminous concrete is open to grave objections, and the use of clean stone chips or small gravel free from particles that will pass through a ⅛-in. mesh seems preferable.

Construction—Penetration Method.—An important factor for successful results is the thorough compaction by rolling of the road metal before the spreading of the bituminous material.

The use of fine sand on top of the bituminous material is open to grave objections, and clean stone chips or small gravel, free from particles that will pass through a ⅛-in. mesh is preferable.

Construction—Surface Treatments.—The success of surface aplications is proportionate to the adhesion obtained by the bituminous material to the old road surface, and such degree of cleanliness of the latter must be had, by means of sweeping or other methods, as will insure a proper degree of adhesion.

Whether or not the aplication of bituminous material is to be followed by an application of mineral material, and the amount of time to be allowed to elapse between the application of bituminous material and a subsequent application of mineral material, depend upon local conditions and upon the character and amount of the bituminous material used.

The use of fine sand on top of the bituminous material is open to grave objections, the use of clean stone chips or small gravel, free from particles that will pass through a ⅛-in. mesh being generally preferable.

Attempts to construct and maintain by bituminous surface treatments a carpet of a greater total thickness than ½ in. have generally been unsuccessful, and in construction of a successful carpet of a total thickness approximating ½ in. the material should be applied in layers, at intervals, rather than by the construction of the total thickness in one application.

The amount of bituminous material to be used depends upon the local conditions in any particular case, but excess in any application is to be avoided, as a deficiency may be corrected by a subsequent application, whereas an excess in any application is difficult, if not impossible, of correction.

The success of results depends first upon the condition of the surface to which the treatment is applied. Even the best surface treatment can not correct defects in the original surface, though it may reduce or modify them.

The application of the bituminous material by means of a pressure distributor is, wherever practicable, preferable to gravity or hand pouring methods.

Maintenance and Repairs.—Repairs to bituminous pavements and bituminous surfaces should be so made as to secure immediately the greatest possible homogeneity.

It is even more necessary than with many other types of construction to carry out repairs on bituminous pavements and bituminous surfaces immediately the desirability for them appears.

The committee also presented a nomenclature of about one hundred terms, and recommended that "for the sake of avoiding to the utmost further confusion in the use of terms, new terms or phrases, coined with the idea of expressing delicate shades of meaning through the medium of one or two words rather than by longer expressions, be suggested or used only after full, careful and conservative consideration."

BITUMINOUS ROAD CONSTRUCTION

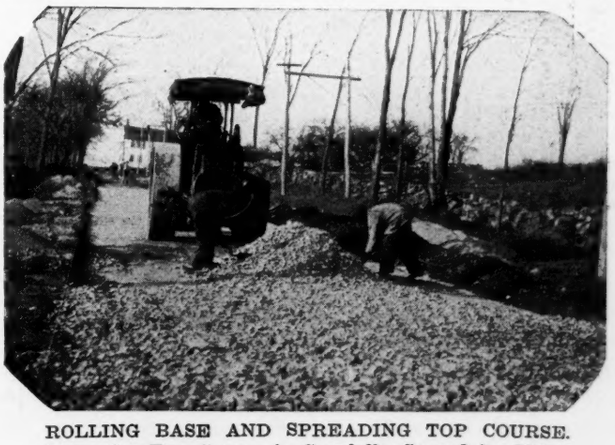
On the Worcester, Mass.-Providence, R. I. Road, at Grafton—Special Care with Foundation—Large Stone in Wearing Course

The State Highway Commission of Massachusetts began using refined tars in bituminous road work in 1907, beginning with surface coatings at Wayland and Norwood, which has been gradually developed into their present improved practice. Typical of their more recent practice was the work done last season on the Worcester-Providence road at Grafton, Northbridge and Blackstone. The following describes the work done at Grafton.

As a preliminary, new culverts and new drainage works were planned to remove all the surface water and to intercept any underground water from the hillsides which might tend to seep underneath the road. The road was then leveled off to subgrade and thoroughly rolled, and a foundation or base course of stone was put on 4 inches deep, using stone which passed a 2½-inch ring and was retained on a ½-inch ring. This course was thoroughly rolled with a steam roller, gravel being applied as a binder, and when completed would have made a fair macadam road. Special pains were taken with the base, as experience of previous years had shown it to be very essential to have a firm, unyielding base if the top was to prove satisfactory for any length of time. Of the two roads constructed at Norwood and Wayland, the base for the former was a macadam road in good condition on firm soil, while in the latter the macadam was in poor condition and the sub-base less solid; and, while the surface coating of the former is still in service, requiring only occasional renewals and patching, the latter has required constant recoating, and reconstruction of it was begun last year.

On the base a second layer of the same size stone was placed to a depth of 2 inches after rolling. The use of large-size stone in the wearing course has been found to be more desirable than small stone where a bituminous binder is used which will hold the stone in place, although for waterbound macadam it is necessary to use finer stone in the wearing course. Where the large stone is held firmly in position it resists wear better than the finer, and transmits the load to the foundation to better advantage. It is essential, however, that the bituminous binder be uniformly distributed, and the subsequent layers of finer stone be so placed as to insure a thorough binding.

After the wearing course had been thoroughly rolled, the binder was applied, in this case Tarvia X. The binder was delivered by the Barrett Manufacturing Company in auto trucks and sprayed on to the road through a single nozzle attached to a hose, a pressure of 20 pounds to



ROLLING BASE AND SPREADING TOP COURSE.
Stone for Top Course is Carefully Spread by Hand.

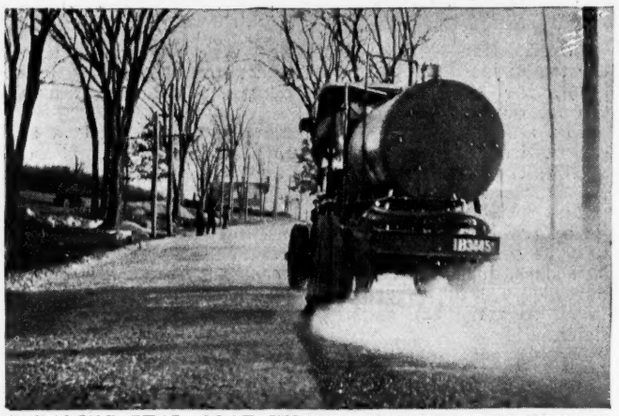
the square inch being applied, the steam pressure for which was taken from a road roller. This binder was brought already heated 45 miles, from Everett, Mass., where the company has a plant, and was still sufficiently hot to be sprayed upon the arrival of the truck. Uniformity of distribution of the binder was considered very essential, and the best man on the work was chosen for this purpose. No drainings from the tank were permitted to go on to the road, and before any binder was allowed to go on the road the nozzle was tested to make sure that it was spraying properly. This careful attention to details resulted in an excellent surface, uniform throughout. The amount of binder used was 1½ gallons per square yard. As soon as it was applied workmen scattered a very thin layer of pea stone, ¼ inch to ½ inch in diameter, being careful not to make a perceptible layer of stone but merely applying enough to chink in the surface and keep the steam roller from sticking. As soon as one tankload of binder had been distributed and covered with pea stone the section just treated was thoroughly rolled to smooth out the surface and consolidate the wearing course.

A seal coat of Tarvia A was applied to this surface, but generally at intervals of a few days in order that there might be sufficient surface ahead to use up an entire truckload of the bituminous material. The seal coat was sprayed on from a pressure distributor attached to the truck, consisting of a rotary pump geared to the driving shaft of the motor and delivering the hot tar to the spray nozzle at a pressure of 35 pounds. A very uniform spray was secured, and the rate per square yard could be varied by changing the speed of the truck, the lowest speed giving approximately ½ gallon per square yard. The truck was able to spray on 1,200 gallons of seal coat in 30 to 40 minutes. Clean pea stone was spread over the seal coat material and then rolled to secure a thorough incorporation of the stone in the surface. As soon as the roller had finished, the road could be opened to traffic.

Tarvia A was used in this case because it is believed to give slightly better results than Tarvia X; but the latter is more generally used for the purpose when the binder is delivered in tank cars, since it is difficult to so regulate the work that two grades of material can be used at the same time. This was the case in the construction of this same road at Blackstone, where the bituminous material was delivered in tank cars and heated by a steam boiler.

In maintaining roads of this kind in Massachusetts the finer grades of tar binders have been found successful in keeping the roads in good condition at a low cost. The cost of this treatment has been very much reduced by using modern types of distributors. Roads at Westminster and South Walpole, built in 1909, are said to have required but a single surface coat since they were first completed, which coat cost about 8 cents a square yard.

SPRAYING BINDER UNDER PRESSURE FURNISHED BY ROLLER.



SPRAYING SEAL COAT UNDER PRESSURE FURNISHED BY ROTARY PUMP.

HIGHWAY INSTRUCTION.

Several of the states are endeavoring to assist in training men to supervise their road construction by instruction given during the winter, when actual construction and maintenance work are at a standstill. Certain instances of this kind have been mentioned by us, and we refer to the matter again because of its importance and to notice programs which we have recently received. The one received from Wisconsin gives as its motto: "Not money alone makes good roads, or makes the roads better, but skill in plans and labor."

The Wisconsin instruction is given in the form of lectures at the "Third Annual Road School" of the State Highway Commission, which will be held in Madison on February 9 to 13. These are open freely to all. More than forty papers on practical work will be read and all are open to discussion. These include such subjects as "Staking Out and Construction of Small Culverts"; "Use of Explosives in Road Construction"; "The Employer's Liability Law"; "Boarding the Men and Teams"; "Unloading from Cars"; "Types of Machinery Suitable for State Aid Construction," etc.

A Winter Course in Highway Engineering is to be given by the Civil Engineering Department of the Ohio State University on February 16 to 28. A charge of $2 is made for registration. "Each lecture will be from one hour to one hour and a half long, followed by from twenty to forty minutes' discussion. Saturdays will be given over to inspection trips." Among the subjects of lectures are: "Good Roads, from the Farmer's Point of View"; "Alignment and Grades"; "Road Building Materials of Ohio"; "Foreign Highways"; "Concrete Road Construction"; "Highway Structures"; "Bitumens," etc.

The Department of Highway Engineering of Columbia University, New York City, gives lectures about once a week, which are free to any one interested, in connection with the regular winter school of highway engineering. Many of these are by representatives of dealers and manufacturers. The lecturers for February are Harold Parker, manager of the Hassam Paving Company; H. W. Durham, chief engineer of highways, Manhattan Borough; George P. Hemstreet, superintendent of the Hastings Pavement Company, and W. W. Crosby, consulting engineer, of Baltimore, Md. The course itself is a regular engineering course for students, and not merely a series of addresses and discussions.

Municipal Journal

Published Weekly at
50 Union Square (Fourth Ave. and 17th St.), New York
By Municipal Journal and Engineer, Inc.
Telephone, 2805 Stuyvesant, New York
Western Office: 608 S. Dearborn Street, Chicago

S. W. HUME, President
J. T. MORRIS, Treas. and Mgr. A. PRESCOTT FOLWELL, Secretary
C. A. DICKENS, Western Manager
A. PRESCOTT FOLWELL, Editor
F. E. PUFFER, Assistant Editor

Subscription Rates

United States and possessions, Mexico, Cuba.....$3.00 per year
All other countries..... 4.00 per year
Entered as second-class matter, January 3, 1906, at the Post Office at New York, N. Y., under the Act of Congress of March 3, 1879.

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FEBRUARY 5, 1914.

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Value of Highway Maintenance.

The purpose of the Federal Office of Public Roads and the American Highway Association in cooperation with the road officials of certain of the southern states to conduct experiments in maintenance is a very important step in the right direction, in our opinion. Experimental construction has been conducted in various parts of the country by the combined efforts of the federal office and the state officials; but we have previously expressed it as our opinion that entirely too little attention is being paid to maintenance in proportion to the enormous amounts being spent in construction. It is stated that arrangements have already been made to place 110 miles of road under the control of the government engineers so far as maintenance is concerned.

This action is taken none too soon, and it is to be hoped that it will be extended to other states, and especially that it will stimulate all road authorities to an active interest in the matter of maintenance. It has been said by many experts, but apparently realized by too few citizens, lawmakers, and even road officials, that there are no permanent roads, but that every road needs to be placed under the supervision of a maintenance corps from the day it is completed. Unless immediate realization of this is had by road officials generally, a very few years will see the tens of millions of dollars' worth of roads which have recently been and are now being constructed falling into a condition of disrepair which will bring disgrace upon a considerable number of our states which are now flattering themselves as being most progressive in road matters.

Is the Government Encouraging Make-Shift Road Work?

The Office of Public Roads of the Department of Agriculture has described in Bulletin No. 53 the efforts which it has made during the year 1912-1913, the ninth year of its operation, in constructing object lesson and experimental roads throughout the country. An inspection of this impresses us with the unsatisfactory nature of the services rendered by this office from our point of view. It seems to us that the lesson which the department should endeavor to teach in the object lesson roads should be how to build the best roads with the several kinds of material available in different parts of the country, using the appliances most suitable and labor which has been trained to the work, and what such roads should cost if economically constructed. Instead of this, the department has apparently endeavored to demonstrate how roads can be built, using not only local material, but also whatever make-shift appliances and inexperienced labor it may be furnished with by the local authorities, the department furnishing only the service of an engineer in the planning and supervision, who apparently takes with him to the work nothing but his experience, a two-foot rule and a notebook.

In carefully looking over the records of the 488,331 square yards of roadway built in this way last year we find, for instance, that in constructing the Black Rock, Ark., macadam road stone was loaded into farm wagons, a 6-ton horse roller was used (which was found unsatisfactory) and no sprinkling wagon was available. At Jerusalem, N. C., slat-bottom road wagons were used (these were used in most of the other constructions also), and the crusher had a capacity of only 50 yards a day, while at North Wilkesboro, N. C., a 25-cubic yard crusher was used. At Norton, Va., stone was hauled 3½ miles in wagons for $1 per cubic yard, while a traction outfit which was obtained for part of the work showed a cost of only 21 cents per yard. The North Wilkesboro road, which consisted of a 12-inch telford base with a 6-inch macadam top, cost $1.8875 per square yard. Even if we deduct from this the cost of excavation, embankment, clearing and grubbing and shaping the subgrade, and omit any charge for the use of stone crusher, quarry, elevator or bins, we still have a cost of $1.58 per square yard. As labor averaged only about 13½ cents an hour, and double teams 30 cents an hour, this cost certainly seems high.

It may be that most, if not all, of the roads built in this way showed excellent results for the labor and appliances which were used, but it does not seem probable that many of them could have been first-class roads, and this is admitted in some cases; nor do they even seem to have been constructed at low cost, considering the results obtained. The system of furnishing no appliances or skilled labor excludes the possibility of giving proper instruction as to the best methods of construction, and makes the cost data of little practical value as a basis for figuring extensive work in the future. Make-shift machinery and make-shift labor can only secure a make-shift road, and the officials in charge of road work in different parts of the country should be encouraged to rise above these practices as rapidly as possible rather than to put up with them. Even if they are not able to afford the best appliances and have not trained labor, they should at least be given the object

lesson of what a good road is, toward which they may strive as a goal, and they should be given the object lesson of what expert labor can do, so that they may know toward what end to train their home labor.

It seems to us that the object of the Office of Public Roads should be to demonstrate in all parts of the country proper methods for economical road construction, and this can be done only by using a well-organized force of men ranging in grade from superintendent to skilled day laborer, and a proper equipment of tools and machinery, including road machines, traction engines, crushers, steam rollers, sprinkling carts, and many minor tools—in a word, such an organization as is maintained by a first-class contracting firm. This outfit could be carried from one job to another. Only a small gang would really be necessary, which might work together or be scattered, two or three men to a gang of native laborers, to instruct the laborers in their part of the work while the government foreman instructs the local foremen in theirs.

Too much stress cannot be laid upon the necessity of educating laborers to become skillful in this class of work. Any man can lay some kind of a telford foundation, but only those who have become skillful at it can do it rapidly and right. The same is true of throwing stone into a crusher, and the skill of men shaping the finished grade of the macadam is of the greatest importance. If a complete skeleton organization were taken to a district to pave a road, gaps in the organization could be filled in by local men who could learn much within a few weeks or months, and would later aid greatly in the building of other roads in that locality.

The lack of anything like a sufficient number of skilled road builders the country over is the cause of much of the criticism regarding rough work being done on many state roads. State and local road officials should have impressed upon them the importance of skilled labor and taught not to underestimate the value of the man behind the shovel; also that the laborer, no matter how skilled, cannot do the best work unless supplied with good equipment. Only when given this combination of labor and equipment is a supervising engineer in a position to teach a community the proper methods of economical road construction. And no other methods ought to be taught.

Traffic Census on Streets and Roads.

Municipal Journal and others have for several years been urging that the matter of census of road traffic be taken up systematically and generally as one of the important items in the study of road economics, and it is encouraging to note that appreciation of its importance has become more or less general. In the seventh annual report of the County Road Commissioners of Wayne county, Michigan, for the year ending September 30, 1913, it is stated that census traffic was taken on a number of the principal roads of the county during seven continuous days in August and again in September of 1913; and the records of these are given in the report. The Massachusetts State Highway Commission has been keeping such records systematically for two years or more, and a number of cities also are keeping records of traffic on various streets to permit an intelligent comparison of the wear of different kinds of pavement, New York having taken hundreds of such records within the past year or two.

One of the most valuable uses to which such records can be put is the furnishing of data on which to base a definition of the now very indefinite terms, "light traffic" and "heavy traffic." A comparison of the amount of traffic on city streets and on country roads also is an interesting possibility.

Apparently the most heavily traveled road (outside of the city of Detroit) in Wayne county is Woodward avenue, and the heaviest traffic recorded on that was 21,186 vehicles in one week, or an average of 3,027 a day, of which a total for the week of 2,715 were horse-drawn and the rest were automobile. This was by no means a typical country road, however, but carries probably the heaviest pleasure traffic from the city of Detroit. More typical is what is known as River Road. On this the census showed a travel of 3,333 vehicles for the week, of which 947 were horse-drawn.

On Hillside avenue, in Jamaica, L. I. (a suburban section of New York City), a census traffic in October, 1912, showed a daily average of 1,601 vehicles, of which 1,142 were automobile. A census taken in November, 1913, on Broadway, New York City, near Exchange Place, for twelve hours only, showed a total number of vehicles of 1,386, while other records have shown on Wall street 2,443 vehicles, and 8,665 on Fifth avenue near 58th street. It thus appears that the traffic on Fifth avenue, which is perhaps the heaviest in the city, is nearly three times that on Woodward avenue, outside of city limits, and more than eighteen times the traffic on the River Road.

These figures, however, do not correctly represent the relative wear upon the pavements of these streets and roads, for the reason that the weight of the vehicles is not taken into account, but especially because the width of the roadway is a very important factor. The average load per day in tons per foot width of roadway of the several pavements is an approximately correct method of comparing the amount of wear of the pavement. The tonnage per foot width of the several roads named above figure out as follows: Fifth avenue, 315; Wall street, 148; south Broadway, 58; Woodward avenue, 342; River Road, 51, the two last being but 16 feet wide.

In the case of south Broadway, the weather during the day in question was fair. During the week of observation of Woodward avenue there were five fair days, one cloudy, and one with rain, while during the census on the River Road every day was pleasant.

These figures would indicate that the Woodward avenue pavement is subjected to more severe wear than is Fifth avenue, and that even the River Road nearly equals south Broadway.

The Department of Streets of Oakland, Cal., has taken traffic census of most of its main thoroughfares at regular intervals for the last year or two, and only regrets that the work was not begun ten years earlier. One of the interesting facts which it learned from the figures collected is the effect which the width of roadway has upon the wear of the pavement. It gives as an illustration a bridge and a street, each of which carries almost the same tonnage per foot of width, or 14.9 tons and 15.1 tons, respectively, and consequently have presumably the same wear, while the total tonnage on the street is nearly three times that on the bridge. The method adopted by Oakland for taking and computing the census is substantially that recommended by the Committee on Traffic on Streets and Roads of the American Society of Municipal Improvements in the report submitted November, 1912.

INCINERATOR PLANT FOR LOCKPORT.

Information for Contractors.

The city of Lockport, N. Y., is expecting to obtain by contract an incinerator plant, with the enclosing building, capable of "reducing to non-offensive, thoroughly-burned ashes or clinkers, entirely free from organic mat-

ter, 20 tons of garbage, dead animals and all kinds of combustible and organic refuse mixed, per day of 24 hours." Two ten-ton units are wanted.

The plant must be guaranteed to destroy 20 tons of such material a day under all weather conditions so as not to cause a nuisance by the handling, storing or burning of the refuse. A guarantee must also be given of the number of men required to operate the plant and the maximum and minimum amounts of fuel required per day and per ton of refuse consumed. The temperature of gas combustion must be at least 1,000° F. The plant must be guaranteed for one year against defective workmanship or material. The proposal is to give a price for an additional ten-ton unit, good at any time within ten years. Bids will be received February 16.

STREET MONUMENTS IN OAKLAND.

During the fiscal year of 1913 the Street Department of Oakland, Cal., set 164 new monuments, and reported that it expected to set at least 200 more the following year. Previous to that time there were only six official monuments in the city, the chief reason for this being that the department was not upon a salary basis, but the engineering work was paid for by fees. The monument adopted as standard by the department consists of a concrete shaft, 6 inches in diameter and 3 feet deep, composed of one cement, 2 sand and 4 broken stone, the top of this being 12 inches below the street grade. In the top is set a brass pin ¼ inch in diameter, and projecting slightly above the top of the concrete. At about the level of the top of this shaft is set a horizontal ring of concrete, 6 inches thick, and having an opening in the centre 8 inches in diameter lined with an iron plate which projects a half inch or so below the bottom surface of the concrete ring, which ring supports a cast-iron top with a 7¼-inch opening, closed by a cast-iron plate, ¾ inch thick, as a cover.

MARSHALLTOWN'S AUTO PARKING

Streets Around Court House Widened and Sixteen-Foot Strip Reserved for Automobiles, Guarded by Isles of Safety.

By HARRY J. RODGERS.

The automobile has forced onto cities two traffic problems. One is how to control the constantly moving and ever increasing number of cars that throng the streets; the other is how best to prevent automobiles from being parked along the curbings in the business districts and thus occupy space needed for traffic.

Large cities have their traffic police; small cities cannot afford such a luxury. Moreover, metropolises, because of the independence their size gives them, are able to enforce traffic regulations to control these conditions to an extent not possible or feasible for small cities. It's poor business, from the viewpoint of trade of a little city, to arrest Mr. Farmer and fine him for leaving his car standing in the street. It is like slamming the door in a customer's face.

In most modern small cities the practice of the farmer tying his team around the court house or public square or in the main street is no longer tolerated. When such towns and cities drove the farmer's horses away from these tying places they furnished him a market place and convenient hitching post to tie his team that answered the purpose better and took the horses and wagons out of the business district. Now Marshalltown, Iowa, has done the same thing for its automobiles and those from the trade territory tributary to it. This city was platted as a one-street town, and Main street is still the principal retail thoroughfare. Main street, unfortunately, is not wide—48 feet from curb to curb—and as Marshalltown has all, or more, of its proportion of the state's ratio of one automobile to every thirty-five people the question of what to do with all the cars that were constantly left standing in Main street became a pressing one.

This problem was solved by the city commissioners, county supervisors, certain property owners, and the Marshalltown Club, combining to provide a municipal parking place in the very center of the city for 150 automobiles, and at the same time got the cars out of the way of traffic, and made a pretty civic center of the court house square and the streets that surround it.

This square is bounded by Main street on the north, First avenue, Church and Center streets. Around it stand three banks, post office, Masonic Temple, the largest office building of the city, and many of the important business houses. To these is to be added a $65,000 Y. M. C. A. The public utilities company is preparing to double track its line in Main street next season, so that it was necessary to take prompt action to relieve the congestion in that street before it was torn up by tracklayers.

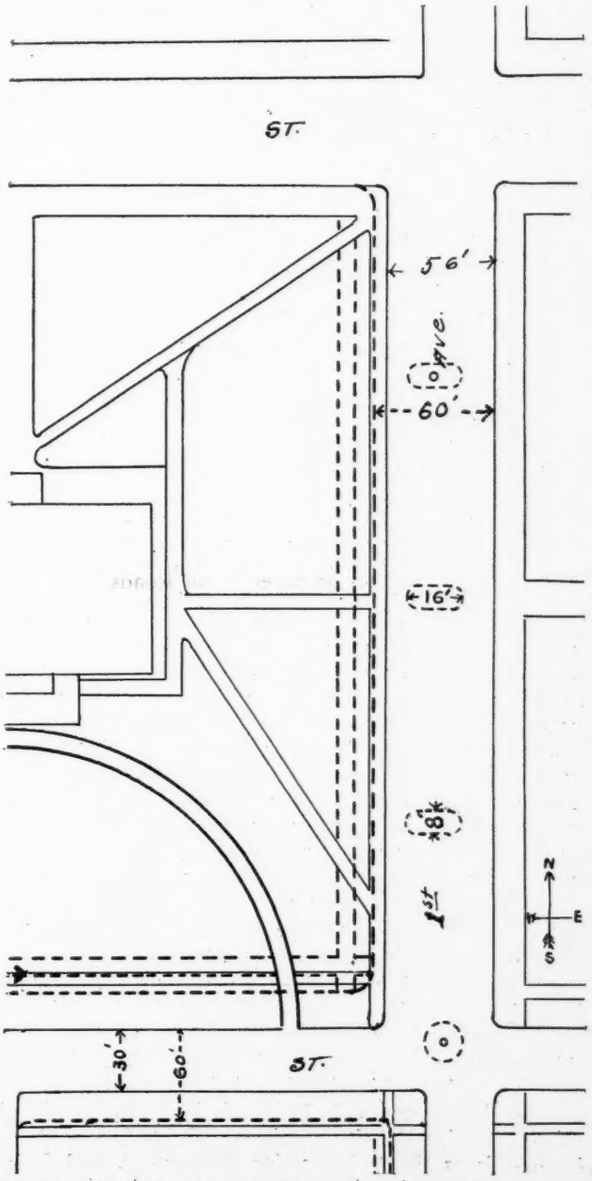


FIG. 3.—S. FIRST AVE., FROM CHURCH NORTH TO MAIN. Full lines show old condition; dotted lines, new condition.

FIG. 1.—SOUTH FIRST AVENUE BEFORE PARKING.

The other streets surrounding the square are of different curb-to-curb width: First avenue was 56 feet, Church street 30 feet, and Center street 48. It was proposed to widen these three to a uniform width of 60 feet, curb to curb, and to create in the middle of each a zone of safety in which automobiles could be parked. In each case the strip of land needed for this boulevard project was taken from the court house square side.

The three sides of the square are 1,134 feet long. The estimated cost of the project is $12,000 to $14,000. One-third of the work, the block in South First avenue, has been completed at a cost of $5,474.11, which includes the cost of a new sidewalk on the court house side.

Figure 1 shows a view of this street as it was before it was widened. Fig. 2 shows the finished pavement with the safety zone filled with automobiles. The other two streets, which will be like it when finished, are to be boulevarded early next spring.

The widened pavement was divided into three sections: a central longitudinal strip 16 feet wide for automobiles, and a driveway 22 feet wide on both sides of the parking space. This central strip was protected from traffic up and down the street and made safe for cars by being protected at intervals by oval parkings 8 by 16 feet, curbed with cement and providing in the center of each a splendid place for an electrolier post. The parkings were spaced 94½ feet center to center. Round parkings 16 feet in diameter were adopted; but, after the curbing for one was poured, it was found that the circle occupied too much pavement space, so the ovals were substituted. Round parkings are, however, to be built in the Church street intersections.

A heavy and massive design of electrolier post was chosen. They are cast iron and consist of a tapering fluted column resting on a square base and carrying five 100-watt lamps. The top of the top globe is 12 feet 6 inches above the footing. As central markings for the avenue the posts have been made very prominent and effective ornamentally by being enamelled white. A uniform plan of planting all the parkings to either flowers or hardy flowering shrubbery is to be carried out next spring.

All of the old paving around the square is two-course brick, and because much of this material can be used again brick or brick block pavement will replace the old. The First avenue pavement was in very bad shape, but most of the brick of its foundation course were good enough to use in the foundation of the new paving.

All the owners of property abutting on First avenue signed waivers, thus making unnecessary the cost of advertising for bids, to say nothing of the delay in letting the contract that such formal procedure would have made necessary. They agreed, also, to pay for new pavement 17 feet wide abutting their properties.

A committee composed of Commissioner W. E. Nicholson, representing the city, Chairman of the County Board of Supervisors E. B. Emes, for the county, and Judge B. F. Cummings, for the property owners, let the paving contract for $1.87½ a square yard. The contract called for a two-course brick pavement, with a foundation of the old brick, the top course of vitrified paving blocks with cement-filled joints and cushions of sand between the courses and under the foundation course.

Longitudinal expansion joints 1¼ inches wide were run next the curbs, and transverse one-inch expansion joints were spaced 50 feet apart. The joints were filled with asphaltum. The contractors furnished all labor and material, except the old brick, tore up the old pavement, and did all the grading. The paving blocks were subjected to a severe double inspection—once while they were being wheeled onto the job, and again after they were laid. Probably 5 to 10 per cent of them were rejected. W. B. Skogerson, city engineer, who prepared the plan, supervised the construction.

The proportion of the cost, $1,318.68, the property owners paid has been mentioned. The division of the cost between them, the county and city, was reached amicably in advance. The city paid for a strip of paving 7 feet 8 inches wide 378 feet long, the length of the block; paid for the new curb on the court house side and for the new sidewalk, also for an intersection 15 by 60 feet in Main street—a total of $995.07. The county paid $3,160.36 for 35 feet 4 inches of pavement 378 feet long. The division of the cost of the rest of the project will be made on about this same basis.

Fig. 3 is a plan of the court house square and surrounding streets as they were before the project was begun, and shows by dotted lines the plan of the completed project.

Some objection has been made to placing these parkings in the center of the street. It has been argued that the curbing, shrubbery and electroliers would be destroyed by runaway teams, and that the parkings would obstruct traffic. First avenue has been open for three weeks during the heavy Christmas trade, and judging by that limited time it appears that none of these objections are well founded.

The safety zone in this block holds fifty cars comfortably without blocking the intersections. The driveways on both sides are wide enough for teams to pass, but vehicles are supposed to take the right hand side. Cars parked in the street are also supposed to follow the direction of traffic when going in and coming out, and they do so.

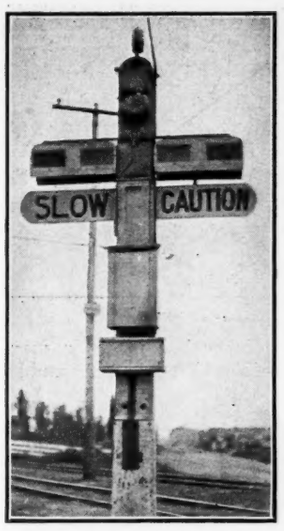
Opinion is quite general that the city has never undertaken a more needed or satisfactory project of a utilitarian nature, or one that has added so much to the beauty of its civic center, a tree-covered square where stands its splendid court house. Where heretofore Main street and the streets near the square were more or less blocked by standing cars, these automobiles are now parked in First avenue and the pavement of the other streets is entirely unobstructed and clear from curb to curb for traffic.

FIG. 2.—AFTER PARKING. AUTOS IN PARKING SPACE.

AUTOMATIC CROSSING SIGNAL.

An electrically-operated danger signal for crossings has been installed on street intersections in Los Angeles at the tracks of the Santa Fe and the Salt Lake routes. Its novel feature is a clever arrangement of four arms like the blades of a Dutch windmill, and two of these are always displayed. The normal position shows two blades painted white and bearing the words, "Slow," "Caution," extending at right angles to the post that supports the signal. When no train is within the "danger zone" these serve as a general warning of a railroad crossing. As a train enters the "danger zone" the arms change their position by gravity. The white arms swing out of sight behind the post and two arms painted red rotate into position. They bear the inscription, "Stop, Danger." At the same time the ringing of a bell and the illumination of a red incandescent bulb call attention to the signal. Thus by motion, light, sound and the written word the most careless driver is reminded of his danger, while at all times a signal of caution is displayed.

The operation of this device is of unusual simplicity. The blades are held in normal position by an electromagnet, and the passing of a train over the track within the zone automatically breaks the circuit, causing the red arms to swing into place by their own weight. After passing the crossing, the train automatically forms the circuit again, energizing the magnet and swinging the blades back to normal. The bell and lights are operated in the same way.



NORMAL POSITION. CAR APPROACHING.
AUTOMATIC CROSSING SIGNAL.

OIL MACADAM IN OAKLAND.

The city of Oakland, Cal., during 1913 confined its paving construction work to two kinds, asphalt and oil macadam. The former is constructed of a 1½-inch wearing surface on a 2-inch asphalt-concrete binder course, supported by a 6-inch foundation of 1:3:6 concrete. Oil macadam pavements are constructed in the residence districts only. When first introduced, these pavements were ordinarily built of macadam rock, 8 inches deep at the crown and 6 inches deep at the gutter before rolling, compacted and treated with two layers of heavy road oil (90 per cent asphalt), totaling 1½ gallons to a square yard. This type of pavement requires careful workmanship, particularly in the matter of making it firm enough to carry heavy loads and at the same time sufficiently porous to admit the oil. This method of construction has now given way to a two-course pavement, consisting of a foundation course of waterbound macadam, 4 to 5 inches thick, and a top course of oil macadam, 2½ inches thick, the oil being distributed in three oilings of about ½ gallon per square yard each. This construction costs about 10 per cent more than the single course work, but seems to be justified by the fact that the increase in the number of heavy auto trucks and material wagons requires a better pavement. The two-course pavement is far smoother and stronger than the single course, and it is believed that the use of a cheaper rock in the base and a simplification of the workmanship will keep the price down very close to that of single-course work.

Oil macadam streets are cleaned only once a year, funds not being available for frequent cleaning. In this cleaning, rotary brooms are used, which is much less expensive than cleaning with hoes, as is necessary on plain macadam streets. In the business and semi-business sections, where the traffic is less heavy than in the downtown section, but where the streets are cleaned frequently, the suction machine sweeper is used in order to avoid the annoyance and inconvenience of the dust raised by the rotary broom. In the downtown business section the streets are cleaned by hand sweeping.

It is necessary to keep the surface of oil macadam streets in as nearly perfect condition as possible. To repair any breaks in the surface, or where trenches have been cut, the maintenance division of the Department of Streets maintains an oil-patching crew which is equipped with an oil-patching machine in which the oil may be kept at any desired temperature for the entire day. The oil is distributed by pressure through a flexible metallic hose, and a very small area may be patched.

As fast as possible water-bound macadam streets which are worn out are treated with a coat of oil and screenings. This work was started in an experimental way in 1910 and was not particularly successful until proper machinery was obtained; but with the modern high-pressure distributing machines now used the oil is distributed uniformly in the proper quantity, and practically sure results are obtained, according to William J. Baccus, commissioner of streets (to whose report for 1913 we are indebted for this information). At the present time the street is first repaired and rolled, then thoroughly swept with a rotary broom to remove all loose rock and dirt, and then oiled with from ¼ to ½ gallon of road oil to the square yard, then covered with clean screenings and again thoroughly rolled. The amount of oil is determined in each case by the assistant deputy or oiling foreman, in accordance with his experience. Care is taken not to put on too much oil, as most of the failures in the work have been found to result from this or from lack of proper repairing or proper cleaning. During the fiscal year of 1913, 328,725 square yards of streets were oiled, in which there was used 201,401 gallons of oil, costing $8,516, or 2.59 cents per square yard, labor and screenings bringing the cost to 6.8 cents per square yard.

ROAD MAP OF ALABAMA.

A road map of Alabama is being completed by H. E. Anschutz, of Clearwater, Fla., under the direction of W. S. Keller, state highway engineer of Alabama, which will be four feet wide by six feet high, on which will be shown all the roads of the state as reported by the county officials. On the map hard surface roads are shown by solid heavy lines, improved soil by heavy dotted and unimproved by light lines. Prominent cities are shown; waterways only where they form parts of country boundaries. The scale is five miles to the inch. A reproduction, half of this size, will be reduced on zinc for publication, copies of which may be had from the Highway Commission.

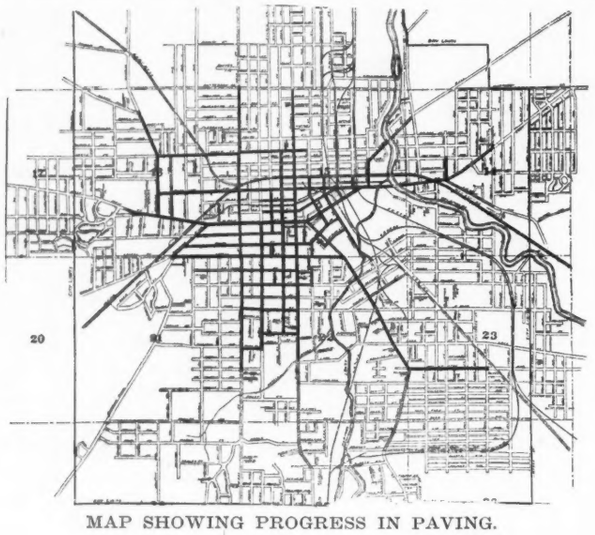
The WEEK'S NEWS

Start Work on Grade Crossing Elimination—Sewage Disposal Plant Urged for Akron, O.—Denver May Buy Water Plant—Water Meters Reducing Waste—Sewer Gas Explosion in Detroit—Motor Engines Tested—Routes of Chicago's Subway—Design of Pittsburgh's New City Hall.

ROADS AND PAVEMENTS

Paving Work in Kalamazoo, Mich.

Kalamazoo, Mich.—The city engineer has issued a map of Kalamazoo showing the progress which has been made



MAP SHOWING PROGRESS IN PAVING.

in paving work in that city. The solid lines in the accompanying map represent the work accomplished before 1913 while the semi-solid lines indicates the paving laid las year.

Has Well Drained Roads.

Fremont, Neb.—The country roads of Cuming township are in good condition to withstand traffic. A few years ago the township let a contract for the building of several miles of road to an expert road-builder and the result was so generally satisfactory that an additional contract was awarded to the same firm during the year 1913 for about $10,000 worth of work. The grades are high and broad and well drained so that even in wet weather they are in good shape. These roads mean much to Scribner in securing the trade and grain from the farmers from a distance who have about the same mileage to other towns. A large part of the trading is done with automobiles and the town that can be reached over the best roads reaps the benefit.

Road Constructing System Works Well.

Spartanburg, S. C.—The new method of road working tried on the Howard Gap road and approved several days ago for the Blackstock road is attracting considerable attention among the good roads enthusiasts of the county. The scheme is to divide a road desired to be worked into sections of approximately two miles each and to put each section under a competent committee or overseer to look after its maintenance. The road is first to be crowned and then worked over and kept in repair with the use of the split log drag.

Concrete Replace Wooden Bridges.

Manhattan, Kan.—Five concrete bridges of the latest improved type are to be built in Harvey county soon under the direction of the state highway engineer, W. S. Gearheart, at the Kansas Agricultural College and of Harvey County's very active board of commissioners. Wood floor bridges are not popular in Harvey county and the board is replacing them as fast as possible with modern concrete structures. Two miles of wood floor bridges still remain but the commissioners are getting rid of them as fast as they can obtain funds to build concrete ones. Referring to the progress on concrete bridge construction, Mr. Gearheart said: "Fifteen concrete bridges already have been completed in Harvey county under our supervision, and they have plans for five more. At Halstead, we have just arranged for a 150-foot concrete bridge over the Little Arkansas which will cost $13,500. Many of the wood bridges in Harvey county are 150 to 300 feet long when a concrete bridge of one-third that length would have been large enough. The taxpayers have been saved many dollars through our efforts, not only in cutting down the length of the bridges but by direct supervision of the construction work." The commissioners of Harvey county are C. M. Anderson, C. J. Baer and E. F. Barrows.

Towns Joined With Macadam Road.

Sherman, Tex.—Work on the half of mile of road between the Sherman and Denison good roads district, joining the two together with a macadam road, has been commenced. The work will cost approximately $5,000, and it is expected to complete the work in thirty days or less time if weather conditions stay good. When this half mile is completed the twin cities—Sherman and Denison—of Grayson County, will be joined together by a modern, model permanent highway.

University Laboratory Will Test Road Materials.

Augusta, Me.—By an arrangement with the State Highway Commission, of which Paul D. Sargent, '96, is chief engineer, the road materials testing laboratory is to be established at the University of Maine in charge of the department of civil engineering. Tests will be made by the members of the faculty and the laboratory will also be available for the regular work which is given the students. The department announces that the laboratory will be much better than that in the Office of Public Roads in Washington, and far in advance of laboratories of this kind at the average institution.

To Hire Paving Expert.

Scranton, Pa.—All the material which will be used for asphalt paving this year will be analyzed by an expert before being laid, and the actual laying of the paving will be supervised by a competent inspector, who will enforce every detail of the specifications. Director Hayes asked $1,500 for the work of analyzing all paving material. An expert in Philadelphia has already been secured who will charge one cent per square yard analyzed and $25 per day for each day spent in Scranton for advisory purposes. The question of establishing a municipal laboratory was broached by Councilman Berlin but was discouraged on the ground that its maintenance might prove too costly to the city.

Trip Over Washington-Atlanta Highway.

Atlanta, Ga.—According to information received by Fred Houser, secretary of the Atlanta Convention Bureau, representatives of the United States government, the State Highway Departments and the American Highway Association will arrive in Atlanta early this month in machines from Washington. This trip will be made over the Washington-Atlanta public highway, by way of Richmond, Raleigh, Columbia and Augusta. The purpose of the party is to make notes and maps and to make arrangements whenever possible with the county authorities along the route to place the road under government supervision.

Start to Eliminate Grade Crossings.

Buffalo, N. Y.—The elimination of a number of important crossings at grade over railroad tracks in various parts of the city is to be carried to completion by the Grade Crossing Commission, under its supplemental gen-

eral plan, just as soon as weather conditions will permit. The crossings involved for early completion are those at North Main street and the Erie tracks, and the crossings in Military road, over the tracks of the New York Central and the Erie. According to E. B. Guthrie, engineer of the commission, the large undertaking of placing a subway in Main street, where the street used to cross the Erie at grade, has been practically completed, except on the east side of the north approach. The temporary driveway there will be removed, the excavation work finished, and the retaining wall of the approach and paving put in. The subway at Military road under the tracks of the Central and Erie will require about 200-foot approaches and the raising of tracks from 8 to 10 feet, leaving a 4 per cent grade for the travel into this rapidly developing section of the city. The contracts have all been let, and the work is to be started early in the spring or before, if weather conditions will permit.

SEWERAGE AND SANITATION

Sewage Testing Station Reports.

Akron, Ohio—A report of the sewage testing station conducted here in November and December, 1911, has been received by the public service department. The test was made at the recommendation of Engineer E. G. Bradley to select the most efficient and economical process of preliminary and final treatment of sewage; to study the sludge problem and to obtain a means of preventing the aerial nuisance arising from the use of sprinkling filters. In his report, Mr. Hommon makes the following recommendations for a sewage disposal plant: 1—A small grit chamber for the removal of sand. 2—Imhoff tanks of a capacity equivalent to a flow of about 2.5 hours, and sludge beds corresponding to an average net accumulation of about 1.4 tons of dry solids per million gallons. 3—Sprinkling filters operated at the rate of 2,000,000 gallons per acre in 24 hours, and small settling basins of about two hours' flow, with ample means for the withdrawal of sludge. 4—Adequate means for the disposal of an accumulation in the settling basins of about .5 ton of dry solid matter per million gallons. Mr. Hommon states that such a plant it is evident would purify the sewage of Akron in a most thorough manner, and under continued proper operation and efficient supervision, would prevent all visible contamination of the Cuyahoga river below the outlet of the Akron sewers.

Sewer System Nearly Completed.

Halstead, Kan.—With 18,000 feet of pipe laid and 29 manholes completed, work on the sewer system is progressing rapidly. The excavation on some of the flush tanks has been finished, while the full concrete work on the septic tank will require a little more time. For the sludge bed walls have been run and two concrete manholes at the septic tank are under construction. The manhole at which the sewage enters the tank is six feet in diameter and contains three eight inch gate valves and one twelve inch gate valve. The smaller manhole, about four feet in diameter, contains the big check valve which keeps the water of the river from getting into the tank in case of high water. A few more weeks of fair weather ought to see the job almost complete.

To Enforce Sanitary Laws.

Elizabeth City, N. C.—Sanitary Inspector R. C. Gregory is now engaged in notifying the owners of property that their premises must be put in order to comply with the sanitary laws before the spring opens. While a great many property owners last year complied with the law, yet there were many who did not recognize the necessity for improved sanitary conditions and neglected the improvements.

Must Cease River Pollution.

Camden, N. J.—In a letter received by Mayor Ellis the State Board of Health declares that it desires to know definitely by February 17 what Camden proposes to do in response to the demand that it cease pollution of the Delaware river with its sewage. In other words, the State Board wishes to be informed when the city is going to build a sewage disposal system that will cost upwards of $3,000,000 by which pollution can be overcome. The letter received by the Mayor is the State Board's answer to a hearing given city officials at Trenton. Representing the city were Mayor Ellis, Solicitor Bleakly, Engineer Farnham and Street Commissioner Sayers, who explained what has been done toward complying with the order issued two years ago that Camden cease pollution of the river by September, 1913. The city is handicapped by lack of funds to finance such a gigantic proposition and, again, a special committee of council has not found a system that would meet Camden's needs. It was also pointed out, as the Mayor said in his message to Council, that it would be a waste of money for this city to be forced to such a great expense if Philadelphia did not at the same time divert its sewage.

San Angelo to Be Spotless.

San Angelo, Tex.—Every nook and corner of San Angelo is to be made spotlessly clean and kept that way, according to L. F. Heitzler, sanitary inspector here. Citizens have been asked to obey all the sanitary laws and to aid the officers in seeing that San Angelo is kept clean. Many have promised to do so.

Reduce Death Rate from Typhoid.

Providence, R. I.—The death rate from typhoid fever in Providence in 1913 was 10 per 100,000 in an estimated population of 241,000, the lowest rate for the disease ever recorded in this city, according to figures compiled for City Registrar C. V. Chapin. Since 1884 the typhoid death rate here has been reduced from 42.62 to its 1913 mark of 10. The average death rate from the disease for the entire period is 24.10. The best previous record was 11.02, attained in 1911. The 1912 rate was 11.65.

WATER SUPPLY

Offers to Sell Plant to New Jersey.

Passaic, N. J.—Since the issuance of the State Water Supply Commission's report, the East Jersey Water Company has accepted the value placed upon its property by the state's appraisers. Moreover, the property may be acquired without the investment of any cash, for the state can assume the outstanding bonds of the company, amounting to $7,500,000, and give the present owners additional bonds in the sum of $1,300,000 for their equity. These terms were offered, notwithstanding the difference in the inventories of the state's and company's appraisers, the East Jersey company estimating the value of their property at $1,171,700 above the commission's figures. The bonds can be directly assumed by the State Water Supply Commission for the municipalities, and the plan of the commission, if the property is bought, is to lease the plant to the municipalities for the exact sum of the carrying charges. The acquisition of the company system would mean a water supply of 50,000,000 gallons daily.

Urges Denver to Buy Water Company's Plant.

Denver, Colo.—The engineering committee in charge of appraising the property of the Denver Union Water Company has shown by the figures submitted that Denver cannot secure a water plant for the sum voted in the recent bond issue. After five months of investigation the committee submitted the following facts: That the city should buy the Denver Union Water Company plant. That the economic waste that would be entailed in building a new plant is not to be contemplated by the people of Denver, except as a last resort. That it would cost $12,750,000 to build a new plant, which is $5,000,000 more than the bond issue, voted to build a new plant. That the present value of the water company's plant, exclusive of water rights, right of carriage and value as a "going concern," is $10,044,778.31, or $3,000,000 more than the people voted to buy the water company's plant with water rights and every other value.

Will Install Meters for All Services.

Coffeyville, Kans.—The new water and light ordinance, recently passed by the city commission, becomes operative April 1. Under the provisions of this ordinance

all water service furnished by the city goes on a meter basis on that date, and in order to expedite the work the installation of the meters is to be carried on systematically. Instead of waiting for the present flat rate consumers to place their orders for meters the water office proposes to proceed with the installation of the meters by streets. Before the first of April the owners of the property will be mailed a bill covering the cost of installation, including a meter box, amounting to $2.50. These bills will become due April 1, and must be paid on or before the 10th day of April. While the property owners will be held responsible for the payment of the cost of installating the meters, the matter of putting up a meter deposit to insure the payment of water bills, must be settled between landlord and tenant.

Meters to Save Cost of Enlarging Water Supply.

Easthampton, Mass.—One of the important matters which will be urged at the annual town meeting, and will have the support of the Board of Public Works, will be the conservation of the town water supply. Last year a small appropriation was made for the installation of meters, and the beginning of the meter method of sale to consumers which this permitted has already shown in some degree a beneficial effect. It is the hope of the Board of Public Works that a second appropriation this year will indicate a settled policy to work gradually toward the complete establishment of meter service. The water supply of Easthampton became so low a few years ago that an additional supply was agitated. Fortunately an underground supply was discovered which was made available at a moderate cost compared with the project then advocated entailing a cost of $500,000. It is realized that the underground output of water can not last indefinitely if the present rate of consumption continues. Even should the supply hold out, the increase of consumption much beyond the present point would mean the readjustment of the system to a larger capacity, by means of an enlarged or additional reservoir, new pipe lines of large diameter and more powerful pumps, at a possible cost of $100,000. The estimated total cost of complete establishment of the meter system is $13,500, but this sum, which may seem large in itself, is not 10 per cent. of any possible plan for the establishment of a new system.

The Water Supply of Hamburg.

Hamburg, Germany.—The average total quantity of water used per day in Hamburg for all purposes in 1912 was 136,886 cubic meters (177,998 cubic yards), all of which was supplied from the public water system. Of the above total amount 97.3 per cent was metered. The population of Hamburg in the year stated was 986,804, but in 1913 it was 1,006,748. Of the total population, 99 per cent was supplied with water. The foregoing facts have been supplied by the director of the public water works.

Town Leases Water Works.

Roann, Ind.—There has been filed in the county recorder's office of Wabash County, a copy of a lease entered into between the Roann Water & Light Company and the town of Roann, whereby the town is granted the right to use the water system owned by the company. The town has leased the plant for ten years beginning January 20, 1914, the rate paid by the town being $950 per year. At the expiration of this lease the contract may be renewed, provided both parties are willing. The town agrees to keep the machinery, pipe lines, etc., in repair, and to keep the buildings insured, payable to the company.

Construct Pipe Line for Water Supply.

Perry, N. Y.—A force of about 125 men and 15 teams has been secured to start work on the construction of the pipe line for the water supply for Mt. Morris village from Silver Lake. Supplies and pipes have been arriving steadily at Perry, and the laying of the main started at the end of last week. J. C. Richardson, of Ridgeway, N. J., who has the contract for the work, has been in Perry several days making arrangements. The laying of mains and the intake at Silver Lake must be made before the ice breaks up and the high water season commences. The intake pipe at Silver Lake and several hundred rods of the line in the marshes and along the outlet will be laid on the ice and let down into the water after cutting the ice away. The course of the water line will follow the Silver Lake outlet through the village of Perry until it reaches the property of the Perry Knitting Company below its mills in Water Street, when it takes a southerly course into the farming section. An effort will be made to secure a gravity system through the village of Perry, where the main pipe will be 12 inches in diameter. The gravity system will require much extra work, as there is scarcely any difference in the level of the lake and the village of Perry. In many places the ditch will have to be excavated to a depth of 15 feet in order to secure any fall. The average depth will be four feet. The rock comes close to the surface in many places, and much blasting will be experienced along the outlet.

Municipal Water Works Show $267,000 Profits.

Providence, R. I.—The municipally owned water works of the city of Providence made a net profit of $266,964.62 during the fiscal year ending September 30, 1913, after meeting all the expenses of management and paying interest on the outstanding water debt, according to the annual report of City Auditor Philip S. Chase. The total receipts of the department from all sources amounted to $855,310.03, against expenses totaling $588,345.41. The total expenses of the water works, from their beginning to October 1, 1913, including the cost of construction, management and interest on temporary loans and on bonds, amounts to $24,077,409.87, while receipts from all sources to the same date totalled $19,902,639.53. The net debt of the water works Sepetmber 30 had been reduced to $2,118,855.91. Excess of receipts over management and interest expense since the institution of the water works totals $3,559,008.10, which amount has been turned over to the Commissioners of Sinking Funds. During the year the receipts from water rents amounted to $806,940.22, by nearly $40,000, the largest amount ever received in a single year. The highest previous mark was $767,782.45, received in the fiscal year of 1912.

$300,000 Water Supply System Completed.

Brockport, N. Y.—With the new $300,000 water plant practically finished residents of Brockport are now being supplied with water from Lake Ontario. Pumping was started at the lake a few days ago, and the distributing reservoir south of this village was filled with water. All of the mains of the system in Brockport, and the pipe from the lake in the village, were flushed out several times and cleansed of the sediment and other impurities that had collected in the past few months since canal water has been used here. The system consists of ten miles of cast iron pipe from the village of Brockport to Lake Ontario and about one mile of 12-inch cast iron pipe south of the village, connecting the old standpipe with the new concrete distributing reservoir. A brick pumping station and chimney have been constructed at the lake. This building is said to be one of the finest of its kind in this part of the state. A concrete well has also been made at the lake and an intake pipe extends into the lake about 350 feet from shore.

Small Municipal Water Plant Pays.

Woodstown, N. J.—When it comes to the question of a municipal water plant paying this borough produces convincing figures. The annual statement of the borough's finances shows the amount received for water rents for the past year to be $2571.56, while the operating expenses were $1425.85. Besides this, the borough was protected by scores of fire plugs, for which no credit is given in the report.

To Prevent Electrolysis.

Perth Amboy, N. J.—The consumption of water pumped through the city's water works at Runyon has grown to such proportions that a larger supply must be afforded, according to a decision reached at a meeting of the Board of Water Commissioners. As a result it was planned to increase the supply in the "deep run" section and utilize water from artesian wells. In accordance with a motion made by Commissioner W. P. Nolan, who broached the subject, Engineer Samuel J. Mason was instructed to pre-

pare plans to increase the water supply. The board also resumed deliberation on a method to prevent destruction of service lines by electrolysis. The alarming rapidity with which iron service lines are being destroyed by electrolysis under trolley tracks on the city's principal streets, caused the board to again consider a proposition made by the Public Service Railway Company to avoid it. This would consist of running copper wires from the trolley track to the water main in State street near Fayette street and from the main to a negative trolley wire at State street and Buckingham avenue. By means of such an arrangement, it is proposed to carry stray current back to the Public Service lines without harm to underground water lines.

Well Water at Temperature of 119 Degrees.

Geneva, Kans.—The Municipal well has recently yielded water at a temperature of 119 degrees, thus softening the hard rubber valves at the water works. When the water lowered its temperature to 90 degrees, which it registered for several days, the valves were replaced and Geneva's supply was resumed. The water cooled considerably while passing through the underground pipes to consumers. The new air compressors recently purchased by the city will be installed soon at the pumping station, and thereafter there will be no interruption in the water service, even though the deep well again should become heated.

STREET LIGHTING AND POWER

Improve System With Electroliers.

Farragut, Ia.—Through the efforts of the Commercial club the main street will soon have a better lighting system. Six electroliers of three lights each have been purchased and will be placed in rows in each side of the street. This system of lighting is popular and attractive as well as effective.

New Rates.

Bridgeport, Conn.—Reduction in the meter rate of electric lighting has been announced by the United Illuminating company, which will go into effect the first of February. The new rate is 8 cents per k. w., which is a reduction one cent of the present rate. The reduction follows one that was made by the company a short time ago, when the reduction was made from 10 cents to 9 cents per k. w.

Dothan, Ala.—The City Council has voted to reduce the light rate from 10 cents per kilowatt hour to 8 cents for current for lighting purposes and established a rate of 2 cents per kilowatt for power to consumers using 3,000 or more kilowatts per month. These reductions are made possible by the great reduction in cost of operating the new municipal power plant as compared with the old plant.

Los Angeles, Cal.—Fully $250,000 a year will be saved to consumers of electricity in 50 leading towns of Los Angeles county by the 1-cent cut in lighting rates ordered by the State Railroad Commission from the Southern California Edison Company. The reduction followed negotiations between the company's officials and the State Commission.

FIRE AND POLICE

35 Firemen Saved With Pulmotors.

New York, N. Y.—Thirty-five firemen were overcome, two of them being so seriously injured that they had to be sent to a hospital, in a fire in a tobacco factory in New York. Traffic was blocked for nearly three hours and the damage amounted to $50,000. It was half an hour before the firemen made enough headway against the smoke to enter the building. They had not been inside more than five minutes when they began to reel out overcome by the fumes. They fell on the sidewalks in twos and threes until there were so many that the one pulmotor operator who had been summoned could not take care of them. Reserve pulmotors were summoned. There were four from the Consolidated Gas Company and three from the Edison Company, while ambulances were called from the Reception Hospital, Flower Hospital, the Polyclinic Hospital and Harlem Hospital, nine in all respondng. Firemen were lying on the sidewalk five and six in a row, being attended by the relief corps, until they came out so fast that it only impeded treatment to attend them on the pavement. The relief men then moved them to stores half a block from the fire, where they were treated. Every fireman, after receiving his treatment under the pulmotor, returned to the fire, some of them being overcome two or three times.

One Day Off in Six for Firemen.

Portland, Ore.—Members of the Fire Bureau hereafter will be given one day off duty in each six days, instead of one day in each eight. This announcement was made at a regular meeting of the Council by Mayor Albee, and received the unanimous indorsement of the other four Commissioners. By giving the firemen more time off duty it will be necessary in order to maintain the present efficiency of the Fire Bureau to employ ten additional men. To care for the salaries of these additional firemen, who will be employed immediately, the Mayor was authorized to expend the money which was appropriated in the annual budget for the purchase of an additional motor-driven fire engine. Speaking of the change the Mayor said: "I believe the firemen are entitled to this consideration. They remain on duty practically all the time and have little time to spend with their families under the present arrangement. I have gone into this matter thoroughly, and believe that I am justified in giving them a day off duty more frequently."

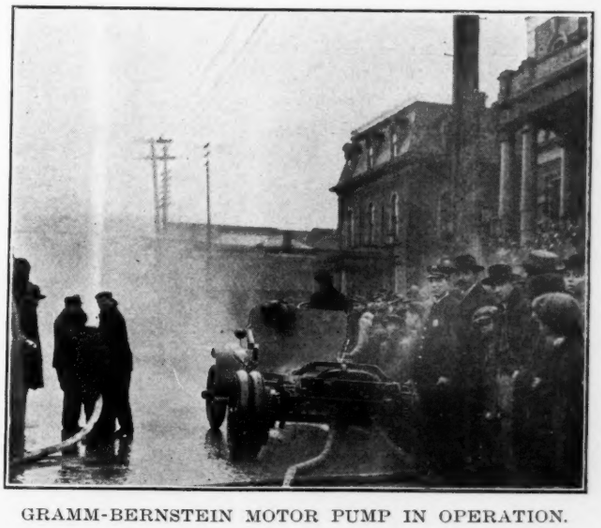
Duplicate Mains to Lower Insurance Rates.

Brenham, Texas.—Engineer Godley of the State Fire Insurance Board, who has been in Brenham in consultation with the business men of this city with reference to securing a lower rate of fire insurance, after a lengthy consultation, has told the committee of Brenham citizens that in order to get a lower rate the city would have to double the water main from the waterworks plant to the city; place a regular fire marshal on duty; keep the auto fire truck at the city hall, in the care of a regular fireman, ready to take the truck to fires at a moment's notice; put on two more night watchmen in addition to the two now employed by the city. This will cost considerable money, but it is thought that the city council will devise means wherewith to meet this additional expense and secure the lower rate.

MOTOR VEHICLES

Demonstrate Gramm-Bernstein Engine.

Lima, Ohio—A successful demonstration has been made here of the Gramm-Bernstein combination motor hose truck and motor driven pump. A striking feature of this



GRAMM-BERNSTEIN MOTOR PUMP IN OPERATION.

machine is that it can be so equipped as to be used for a street flusher, street sprinkler and fire fighting machine. The demonstration was given to show the water pressure created by the motor pump. It proved thoroughly successful for a steady stream was thrown three stories above

a five-story building. A self-starter and improved transmission are included in the machine's equipment. After the demonstration, Capt. H. Tafflinger, of the fire department, expressed himself as highly pleased with the efficiency of the Gramm-Bernstein.

Place Order for American La France Auto Pump.

Charlotte, N. C.—Council has voted to purchase an American La France automobile fire engine. The cost will be $9,000. The Fire Department has already installed an American La France and a Knox.

Robinson Engine Stands Test.

New Bedford, Mass.—The new Robinson engine, rebuilt by mechanics from the Robinson factory, has gone through a three hour test, apparently satisfactory. Chief Dahill will in all probability put the apparatus in commission at Station 10. The chief's report of the engine's performance on Pier 3 in part is as follows: "The machine was run at full capacity for a period of five minutes, developing 120 pounds at pump and showed a delivery of approximately 1000 gallons per minute; an average delivery of 900 gallons at approximately 120 pounds pressure was maintained for the balance of the two hour test. Tested at 200 pounds pressure for 30 minutes showed an average delivery of 570 gallons per minute. Test at 250 pounds pressure showed an average delivery of 460 gallons per minute. Engine worked well throughout tests. I consider test satisfactory and fully complies with guarantee as written in original proposal. Machine will go in service as soon as regular service equipment is added."

GOVERNMENT AND FINANCE

Chose Town Managers.

Dallas, Texas—Residents of a dozen Texas towns and cities have started a campaign to have the city manager plan established. Amarillo recently voted to employ a town manager at a large salary, in the belief that he would save the city thousands of dollars—more than enough to pay his salary and give Amarillo a better government. Denton has decided on a similar course. Its commissioners will receive nominal salaries, and the town manager $8,000 or more.

Petition for Commission Government.

Wenonah, N. J.—A petition containing more than twice the number of names required by law has been filed with Borough Clerk George Grosscup by a citizen's committtee, requesting a special election on the question of commission government for this borough, February 10.

Grand Forks, N. D.—Grand Forks may adopt the commission plan of municipal government, petitions asking that the step be taken being in circulation. They will be presented to the board of aldermen shortly, and a special election will be held.

Fond du Lac, Wis.—A petition bearing 1,247 names has been filed with Mayor Wolff asking an election on the commission government question. It will be possible, in event that the plan carries, to elect the first commission April 7.

Voted to Be City.

Norwich, N. Y.—By a majority of 90 votes the citizens of Norwich have decided in favor of adopting a city charter at a special referendum election. A total of 1,517 votes was cast and the small majority in favor of the charter showed how closely the fight, both for and against it, was waged. The result of this election does not mean that Norwich is yet a city. It was merely to get an expression of the sentiment of the citizens. The State Legislature is the only body that has the authority to make this place a city, and in all probabilty it will do so.

STREET CLEANING AND REFUSE DISPOSAL

Chicago Buys Garbage Plant.

Chicago, Ill.—The plant of the Chicago Reduction Company has passed into the possession of the city. The consideration was a certified check for $275,000, presented by City Treasurer Flynn to W. A. Julian, president of the company. The deal was closed by the entering of a formal verdict of condemnation in the county court, fulfilling the terms of the agreement made by Corporation Counsel Sexton with attorneys for the company. Rehabilitation is expected to require three months.

Crematory Completed.

Savannah, Ga.—Residents of this place, accepting the invitation of Mayor Davant, have visited the new crematory, the erection of which has just been completed. The new destructor has been modeled after the one now in use at Atlanta, Ga., and promises to be efficient.

City to Sell Waste.

Philadelphia, Pa.—Out of the household waste gathered weekly by the ash collecting contractors the city may realize upward of $100,000 a year. Director Cooke has announced that this is possible, and is now laying plans to exercise the claim to paper, bottles, rags, rubber and other household waste as the specifications provide for the present year. The clause in the specifications upon which bids were received provided that in each district the contractor shall deliver such household waste to one or two dumps, designated by the Department of Public Works. Bids are to be invited for the sale of this household waste. When the contract is awarded the police surveillance of the scavenger will be more rigid, and it will no longer be safe to disturb the contents of a rubbish and waste receptacle, before the street cleaning and ash collecting contractor calls for the refuse.

RAPID TRANSIT

Proposed Routes of Chicago Subway.

Chicago, Ill.—After deliberating for some time with the heads of the surface lines the subway committee of the city council local transportation committee has adopted a set of routes for an initial system of subways. The main arteries are to be in Madison and Clark streets. The

ROUTES OF CHICAGO SUBWAY.

north and south artery will be in Clark street, extending from Eighteenth street on the south to Division street on the north. The east and west bore will be in Madison street from Grant Park on the east to approximately Western avenue on the west. Five "links," later to be made part of a comprehensive scheme, are provided for in the plan.

Lay Section of Subway River Tunnel.

New York, N. Y.—The third section of the four-track steel tunnel being built under the Harlem river for the Lexington avenue subway has been successfully laid in the bed of the river. The contractors are Arthur McMullen and Olaf Hoff, and the method of building the tunnel is the same as that used by Mr. Hoff in the construction of the Michigan Central tunnel under the Detroit River. This method involves the construction of the steel tubes on dry land, floating them on the surface of the river to the point desired, and then sinking them into a prepared trench in the bed of the river and encasing them in concrete. The Harlem River tubes will be 1,800

feet log, and with the section just laid there is already in place a stretch of 660 feet. Only two sections remain to be placed, one on the north bank and one on the south bank of the river.

Ask for Municipal Railway.

Bay City, Mich.—A resolution has been presented to the council requesting the charter commissioners, soon to be elected, to incorporate in the new charter a proposition for municipal ownership of the street railway system and to acquire the present system by purchase or condemnation. The Saginaw-Bay City Railway Company operates under two franchises granted prior to the consolidation of Bay City and West Bay City, and the west side franchise expires in 1917. The resolution contains a clause for funds for the purchase of the west side lines at expiration of the franchise.

MISCELLANEOUS

Detroit Will Have $1,500,000 Municipal Building.

Detroit, Mich.—Preliminary plans for the $1,500,000 municipal building which have been prepared by John Scott & Co. and submitted to Commissioner Fenkell of the Department of Public Works, call for a pretentious structure of steel and concrete, designed for the needs of the municipal courts and other departments when Detroit has passed the million population mark. According to the resolution of the Council, the building is designed to house the police courts, the Recorder's court, the Police Department, the Poor Commission and the Board of Health. As planned by the architects, the building consists of three sections, built around a central great court, the central portion, devoted to the municipal courts, being nine stories high, while the two wings are to be four stories high. The entire western wing is designed for the Police Department, and the eastern wing will be divided between the Health Department and the Poor Commission. Each of the departments will have four stories and will be entirely distinct.

Install Voting Machines.

Flint, Mich.—Assurance has been received in a letter from the Triumph Voting Machine Company read before the Common Council that voting machines would be placed here in time for use at the primary election this spring. The communication stated that while the company would not be in shape to provide the exact type of machines purchased by the city that a larger type which would do the same work as the kind purchased would be loaned until the company can install the 16 machines which have been bought recently.

City to Pay for Drinks.

Milwaukee, Wis.—Milwaukee will have to pay a liquor bill amounting to $11.50 for a laborer, according to City Attorney Timlin. Albert Trispel, the injured man, has made a sworn statement that the liquor was necessary and under the compensation act the injured man can recover for this expenditure. Trispel was injured while in the employ of the park board, fixing a handle in an ax, the blade slitting his knee. Following is a list of "medicines" he found necessary: One bottle of wine, $1; claret wine, $2; half gallon of brandy, $1.88; one-half dozen malt tonic, 88 cents; two dozen malt tonic, $3.50; one quart grape juice, $1.40; two bottles claret, 84 cents.

Urge Municipal Milk Plant.

South Bend, Ind.—An investigation recently completed reveals that South Bend pays $165,000 a year for the bottling and distribution of the city milk supply at a waste of $84,000 annually or $7,000 a month. That the high cost of living in South Bend, as in other cities, is largely due to the extravagant waste attending the existence of too many middlemen is shown by figures on the cost of producing and delivering this one article of daily consumption, prepared by a local authority. To bottle and deliver milk to the consumers of this city costs monthly $13,000 while $11,000 is all the farmer receives for it. Under proper methods, it is shown that this $11,000 worth of milk could be delivered to the residents of South Bend at a monthly cost of less than $6,000, making a saving of $7,000 monthly to consumers. It is stated that approximately 55 milk wagons traverse the streets of South Bend daily, doubling on one another's time and again, wearing out three wagons, three horses, three men, where one horse, one wagon and one man, from a modern central, municipal milk plant could make even a more speedy and effective delivery. Consumers are paying $13,000 monthly to approximately 75 men to bottle and deliver milk where 20 wagon men and ten bottlers in a milk plant could bottle and deliver the same milk at a monthy saving of $7,000. The investigators, therefore, suggest the establishment of a municipal milk plant to eliminate this waste and to effect more sanitary conditions, for impure milk could be easily traced to its source.

Berlin Buys Radium.

Berlin, Germany.—The city of Berlin has set aside $60,000 for the purpose of purchasing radium and maintaining the city radium commission, the latest administrative bureau inaugurated in the municipality. The increased scope of radium in medicine led to the establishment of the commission in order that the municipality might have an available supply of the costly metal for public use.

Pittsburgh's Proposed Municipal Building.

Pittsburgh, Pa.—Edward Brown Lee, of Pittsburgh, member of the firm of Palmer, Hornbostel & Jones, was the winner in the contest among fifteen architects who submitted plans for a new court house and city hall building. Mr. Lee gets $5,000 for preparing plans and specifications and will supervise the construction of the $3,000,000 edifice. Work is to be started immediately upon

FRONT ELEVATION OF PITTSBURGH'S CITY HALL.

razing the old buildings now on the site. Four among the contestants were awarded $1,000 each for the excellence of their designs. They were McClure & Sparh, R. E. Trimble, Jansen & Abbott and Rutan & Russell. The first floor of the building is to be divided between county and city offices. Municipal courtrooms will occupy the second floor and the department of supplies will share with the police and detectives the entire third floor. The bureaus of health, and water, also the city council, will find quarters on the succeeding three floors and the remainder of the building will shelter various divisions of the judiciary.

LEGAL NEWS

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Officers—Compensation.

Rackley v. City of Purcell.—A person acting in the capacity of a public officer of a municipality is entitled to only such compensation as may be given by some provision of law.—Supreme Court of Oklahoma, 137 P. R., 99.

Defective Street—Pond.

Doyle v. City of Chattanooga.—A city was responsible for the death of boys 11 and 9 years of age by drowning in a pond which occupied the whole width of a public street, about 120 feet from a public park, in analogy to the rule imposing liability for maintaining an attractive nuisance.—Supreme Court of Tennessee, 161 S. W. R., 997.

Extension of Highway—Docks.

City of New Rochelle v. New Rochelle Coal & Lumber Co.—Where an individual constructs a dock at the foot of a highway, the public easement, by the fact of that construction, is extended over the newly made land to the water's edge.—New York Supreme Court, 144 N. Y. S., 852.

Repairing Pavements—Injury to Boy Playing.

Reck v. Uvalde Asphalt Co.—A company repairing the asphalt pavement of a street was not negligent in leaving unguarded therein a pail of hot cement for washing the edges of cuts, as respects a boy playing on the sidewalk, who, though knowing of the work and the presence of the pail, stepped into it in running after a ball.—New York Supreme Court, 144 N. Y. S., 917.

Titles to Streets—Power to Regulate.

Heppes Co. v. City of Chicago.—The fee of streets and alleys is vested in the local municipality in trust for all the citizens of the state, and not merely for local use, and the Legislature has supreme control over them unless restrained by some constitutional limitation.—Supreme Court of Illinois, 103 N. E. R., 455.

Paving—Cost of Intersections.

City of Henderson v. Connell.—The provision of Acts 1912, that a city may assess the entire cost of street improvements or reimprovements against the property owners and issue bonds therefor does not repeal Ky. St., providing that the cost of improvements at street intersections shall be paid by the city, but must be construed in connection therewith; and hence it does not authorize the city to assess the cost of intersections against the property holders.—Court of Appeals of Kentucky, 161, S. W. R., 1122.

Warrants—Validity.

Washington-Oregon Corporation et al. v. City of Chehalis et al.—The issuance of warrants by a city to a contractor during the progress of the work, which he had contracted to do under an agreement that they would later be exchanged for bonds when issued, did not violate the constitutional provision prohibiting a municipality from loaning its credit to a private individual, since the issuance of certificates of indebtedness acknowledging a pre-existing debt is not a loan of credit.—Supreme Court of Washington, 133 P. R., 681.

Personal Injuries—Notice.

Murphy v. Village of Ft. Edward.—Notwithstanding Village Law providing that no action shall be maintained against a village for damages for a personal injury, unless a written verified statement of the nature of the claim, and of the time and place at which the injury is alleged to have been received, shall be filed with the village clerk within 60 days after the cause of action shall have accrued, a child 5 years old is not precluded from bringing such an action because of its failure, and the failure of its father or mother, to file such notice.—New York Supreme Court, 144 N. Y. S., 451.

Municipal Slaughter House—Statutes.

Noe et al. v. Mayor and Aldermen of Town of Morristown.—While the Legislature might authorize a municipal corporation to establish a single slaughterhouse, to be conducted by its own agents, it would have to provide that all persons having animals to be slaughtered should have the right to resort to that place to do their own slaughtering, or to have it done by their own agents, or the act would be unconstitutional.—Supreme Court of Tennessee, 161 S. W. R., 485.

Water Works—Legislative Control.

Kenton Water Co. v. City of Covington et al.—Laws 1910, requiring any city, before establishing its own water system in any neighboring town which it might annex, to purchase the property of the company then supplying the town, violates Const. prohibiting the General Assembly from imposing taxes for the purposes of any county, city, etc., since the purchase of waterworks would necessitate the levy of a tax, and the Legislature cannot do indirectly what it cannot do directly.—Court of Appeals of Kentucky, 161 S. W. R., 988.

Employees, Agents and Attorneys.

Davis v. City of San Antonio et al.—Under San Antonio City Charter conferring on the city authority to create any office or agent deemed necessary to the city's good government and interest, the city was authorized to employ expert attorneys to pass on the validity of a bond issue, and to employ agents to sell the bonds on commission; the judgment of the council as to the necessity for such employment being final, unless fraudulent or unreasonable.—Court of Civil Appeals of Texas, 160 S. W. R., 1161.

Paving Contract—Action by Agent.

Town of Senatobia v. Ryan.—Though one who contracted with defendant town to make street improvements, upon quitting the work, executed an order requesting payment of amounts due him to plaintiff, if the town and the sureties on the contractor's bond, afterwards agreed with plaintiff to complete the original contract, thereby making him the contractor's agent, the legal title to the cause of action for the amount due on the contract remained in the original contractor, so that plaintiff could sue thereon in his name for plaintiff's own use.—Supreme Court of Mississippi, 66 S. R., 678.

Defective Wiring—Liability of City.

City of Shawnee v. Sears.—A municipal corporation is not required to inspect the wiring, insulation, apparatus, and appliances of an electric light plant, operating in the city under a franchise, to discover defects therein. If, however, a municipality permits a third party to maintain in the streets a system of electrical wiring, a portion of which extends into a sidewalk, constituting an obstruction thereof, and which creates a condition so inherently dangerous as to amount to a nuisance—one that constitutes a peril and menace to persons using the streets—and it has knowledge of such condition, and of the danger, or the circumstances are such that knowledge will be implied, then it may be liable to a person injured because of such dangerous obstruction.—Supreme Court of Oklahoma, 137 P. R., 107.

Fire Prevention—Dangerous Building.

Howell v. City of Sweetwater.—Rev. Civ. St. 1911, authorizes cities to abate nuisances, and to define what shall be nuisances. It also provides that whenever in the opinion of the city council a building is liable to fall and endanger persons or property, the council may order the owner to remove it; that in addition the council shall have power to remove the same at the expense of the city and assess the expense to the landowner. Another article also authorizes the removal of wooden buildings for prevention of fire, etc. Held, that where an old building in a city was so dilapidated that it was likely to fall and was composed of such combustible material as to render it dangerous to the public by reason of the probability of its burning and of its proximity to other buildings, the city could order its removal by resolution of the council.—Court of Civil Appeals of Texas, 161 S. W. R., 948.

NEWS OF THE SOCIETIES

Calendar of Meetings.

February 10-11.
CONNECTICUT SOCIETY OF CIVIL ENGINEERS.—Annual Meeting, Hartford, Conn. J. Frederick Jackson, Secretary, Box 1304, New Haven, Conn.
February 10-11.
VIRGINIA ROAD BUILDERS' ASSOCIATION.—Third Annual Meeting, Murphy's Hotel, Richmond, Va. C. L. Scott, Jr., Secretary, Harrisonburg, Va.
February 11-14.
OHIO ENGINEERING SOCIETY.—Annual Meeting, Columbus, O. D. W. Seitz, Secretary, Columbus, O.
February 12-13.
SOUTHEASTERN SANITARY ASSOCIATION.—Second annual meeting, Columbia, S. C. Dr. James A. Hayne, President, Columbia, S. C.
February 12-13.
NORTH DAKOTA SOCIETY OF ENGINEERS.—Anual Convention, Fargo, N. D. E. F. Chandler, Secretary, University of North Dakota, University.
February 12-14.
NATIONAL CONFERENCE ON CONCRETE ROAD BUILDING.—Auditorium Hotel, Chicago, Ill., J. P. Beck, Secretary, 72 West Adams St., Chicago, Ill.
February 16-20.
NATIONAL ASSOCIATION OF CEMENT USERS.—Fourth Annual Convention, Chicago, Ill. Edward E. Krauss, Secretary, Harrison Building, Philadelphia, Pa.
February 18-20.
IOWA ENGINEERING SOCIETY.—Annual Meeting, Council Bluffs, Ia. S. M. Woodward, Secretary, Iowa City, Ia.
February 24-25.
MINNESOTA ENGINEERS' AND SURVEYORS' SOCIETY.—Annual Meeting, St. Paul, Minn. Wm. Danforth, President, 411 Hackney Building, St. Paul, Minn.
February 26-27.
INDIANA SANITARY AND WATER SUPPLY ASSOCIATION.—Seventh annual meeting, Hotel Severin, Indianapolis, Ind. Dr. W. F. King, Secretary, Indianapolis.
February 26-28.
HIGHWAY ENGINEERS ASSOCIATION OF MISSOURI.—Annual Meeting, St. Joseph. Ray L. Gargill, secretary, St. Joseph.
March 9-11.
ILLINOIS WATER-SUPPLY ASSOCIATION.—Annual Meeting, Urbana, Ill. Edward Barton, secretary, Urbana.
March 12.
VERMONT SOCIETY OF ENGINEERS.—Annual Meeting, Burlington, Vt. George Reed, secretary, Barre.
April 16-17.
TRI-STATE WATER AND LIGHT ASSOCIATION.—Annual Convention, Atlanta, Ga. F. C. Wyse, assistant secretary, Columbia, S. C.
May 11-15.
AMERICAN WATER WORKS ASSOCIATION.—Thirty-fourth Annuel Meeting, Philadelphia, Pa. J. M. Diven, secretary, 47 State street, Troy, N. Y.

American Society of Civil Engineers.

The first of three meetings, New York, January 23-24, for topical discussion on road construction and maintenance, took up three subjects. Engineering organizations for highway work was discussed in a paper by Wilis Whited, bridge engineer, Pennsylvania State Highway Department, who described the department to which he belongs. Municipal highway engineering organizations was treated in a paper by William H. Connell, chief of the Bureau of Highways of Philadelphia, who also described the work of his own department. Charles J. Bennett, State Highway Commissioner of Connecticut, in the discussion, said that a city highway bureau should be in charge of an engineer and be a branch of the Public Works Department, over which should be a business man who had a good training in accounting methods. A. W. Dean, chief engineer Massachusetts State Highway Department, outlined a state organization as consisting of a commission of one or three members, a chief executive, chiefs of divisions according to functions, chiefs of districts arranged geographically, and their employees. W. H. Durham, chief engineer of highways, Borough of Manhattan, praised the London system of organization as being the best of any European capital. This is practically a system of local control by independent units. However, the speaker thought no system could produce results automatically. R. A. Meeker, state highway engineer of New Jersey, spoke of the need of harmony within the organization, and described the New Jersey department. Paul D. Sargent, State Highway Commissioner of Maine, favored a commission of three members who were able men and had the public confidence. John C. Trautwine, Jr., discussing geographical and functional organization, strongly favored the latter. Col. W. DeH. Washington, described the organization proposed for the New York State Department. G. A. Riker, first deputy commissioner, New York State Highway Commission, described the method of selecting six division engineers, which consisted in oral examination, preparation of a thesis and sworn statement of experience.

Paul E. Green opened the discussion of factors limiting the selection of material and methods with a paper. He advocated detailed study in which source of supply as effecting cost would receive careful consideration, and aesthetic considerations not be overlooked. Samuel Whinery thought a highway should be considered as an industrial structure, principally for utility. G. M. Tillson, consulting engineer to the president, Brooklyn Borough, called attention to the importance of the traffic census and spoke of other factors as climate, which limit the life of a pavement. E. H. Thomas, assistant engineer Bureau of Highways, Queens, urged the standardization of broken stone specifications. Major Crosby described an experiment tried by the Park Commissioners of Baltimore in which part of a road was destroyed by trucks, while the part from which they were excluded remained uninjured. Capt. Mark Brooke, assistant to the engineer commissioner, District of Columbia, said that the choice of materials was in many cases limited by the matter of first cost, this automatically eliminating certain materials. The subject of waves in bituminous pavement was discussed by many members.

Equipment and methods of maintenance were discussed at the last meeting, the subject being opened by a paper from W. R. Farrington, division engineer, Massachusetts Highway Commission. He described the appliances used most successfully in the Massachusetts department. He favored the use of mixed materials for making patches; and emphasized the need of storage yards and headquarters. Herbert Spencer, engineer of the Standard Oil Co. of New Jersey, expressed the belief that the penetration method was not a failure. W. H. Fulweiler, chemist United Gas Improvement Company, Philadelphia, described the treatment of 118 miles of road in Maryland, where motor trucks were used. H. B. Pullar, Chicago, described satisfactory methods of surface patching. J. H. Sturdevant, division engineer, New York State Highway Department, described the repair methods in use in that department. P. H. Sharple, chemist Barrett Mfg. Co., spoke on the use of oil on tar bound macadam roads. He said oil affected tar chemically, causing disintegration and that it had a lubricating effect on the stones.

Illinois Society of Engineers and Surveyors.

The program for the twenty-ninth annual meeting at Jefferson Hotel, Peoria, January 28-30, was as follows:

WEDNESDAY, JANUARY 28.

3 P. M.—Address of Welcome. Response by the Vice-President, J. J. Harman. Address of the President, "The Function of the Engineering Society," L. K. Sherman. Committee on Waterworks, Web P. Bushnell, C. R. Beam and A. C. Stanfield. Municipal Engineering at Peoria, L. D. Jeffries. Appointment of Committee on Nominations. Appointment of Committee on Resolutions. Meeting of the Executive Committee.

7:30 P. M.—Committee on Sewerage and Sewage Disposal, Ernest McCullough, L. Z. Jones, Langdon Pearse. Cost and Methods of Building Large Sewers, H. R. Abbott. The Illinois Public Utilities Commission, W. A. Shaw. Sewage Pumping, S. A. Greeley, Langdon Pearse. Improvements in Sewerage and Sewage Disposal. Oxidation of Sewage, L. K. Sherman. (A "Social Smoker" will be held in the meeting room after this session.)

THURSDAY.

9 A. M.—Committee on Roads and Pavement, A. N. Johnson, W. W. Kerch, C. O. Dowdell. Road Work Under the New Illinois Law, A. N. Johnson; Concrete Road at La Salle, Ill., A. H. Hunter. Concrete Paving for Roads and Streets, Ernest McCullough. Concrete Aggregate and Good Concrete, C. M. Powell. Brick Paving for Roads and Streets, W. T. Blackburn. Wood Block Paving, W. Buehler. The Rusting of Steel Bridges, Clifford Older. Committee on Bridges and Masonry, Clifford Older, W. M. Wood, C. H. Nicolet. Peoria Water Works Co., Ray Crozier. Peoria Electric Station, Central Illinois Light Co., C. A. Hoppin. Peoria Recreation Center, R. R. Bourland. East Peoria Drainage and Levee District, J. J. Harman. Afternoon—Excursions. The following places have been divided into seven groups. Guides will be furnished and transportation provided by the local committee: Peoria Water Works Pumping Plant, Illinois Paper Co.—Avery Co., Leisy's Brewery—Clark's Distillery, Electric Station of Central Illinois Light Co., Gas Works of Central Illinois Light Co., Electric Generating Station of Illinois Traction System, Northwestern Railway Extension in congested district, Keystone Steel & Wire Co., East Peoria Drainage and Levee District, Peoria & Pekin Union Bridge, Holt Caterpillar Co.—Herschel Mfg. Co., City Bridge—Recreation Center. Evening—Annual dinner. Reports of committees on new membership, executive committee nominations and the executive committee. Selection of 1915 meeting place. Paper, "The Ohio River Floods," by Charles C. Burdick.

FRIDAY.

9 A. M.—Committee on Drainage. Removal of Dams from the Illinois River, by Lyman E. Cooley. Reclamation of Illinois Valley Flooded Lands, by Jacob A. Harman. Sanitary Measures Following the Ohio River Floods, by E. H. Babbitt. Committee on Weights, Measures and Coinage. Committee on Surveying. Notes on Surveys, by J.

F. Parr. Report of Committee on Resolutions.

2 P. M.—The Testing of Sewer Pipe, by E. S. Wallace. The Testing of Drain Tile, by A. D. Abrams. The Work of the State Water Survey, by Paul Hansen. Drainage Legislation, by R. I. Randolph. Estimates for Public Improvements, by Mr. Matier.

Ohio Engineering Society.

The thirty-fifth annual meeting will be held at the Ohio State University, Columbus, O., February 11-13.

WEDNESDAY, FEBRUARY 11.

10:00 A. M.—Meeting of Trustees. Meeting of Officers. Meeting of Committees. Preliminary Business.

1:30 P. M.—Address of Welcome, Pres. W. O. Thompson, Ohio State University. President's Address, C. E. Sherman. Possibility of Recurrence of the Floods of March, 1913, Prof. G. Warren Smith, of the U. S. Weather Bureau. The Flood at Bellevue, Ohio, John Laylin, Civil Engineer, Norwalk. The Flood Wall and Floods at Portsmouth, Senator John I. Hudson, Civil Engineer, Portsmouth. Report of Legislative Committee. Appointment of Nominating Committee.

8 P. M.—Flood Protection Work at Dayton, Ohio, A. E. Morgan, President Morgan Engineering Co.

THURSDAY, FEBRUARY 12.

9:30 A. M.—Flood Protection at Lima and Marietta, W. J. Sherman, Consulting Engineer, Toledo, Ohio. Flood Protection Plans at Columbus, Ohio, John C. Pryor, Assistant City Engineer in Charge of Flood Work. Flood Protective Work at Tiffin, E. G. Bradbury, Consulting Engineer, Akron, Ohio. The Hydro-Electric Plant and the Flood at Fremont, Ohio, W. F. Schepflin, County Engineer, Fremont. The Engineering Work of the State Board of Health, W. H. Dittoe, Chief Engineer.

1:30 P. M.—Election of New Members. Thermal and Traffic Effects on Pavements of Kansas City and Cleveland, Major J. E. Howard, U. S. Bureau of Standards. What Type of Road Shall We Select, J. R. Marker, State Highway Commissioner. The Mineral District of Cerro de Pasco, Peru Joseph H. Fleming, ex-Superintendent of the Cerro Mines. Election of Officers. Inspection of the State Highway Materials Testing Laboratory, A. S. Rea, Testing Engineer in Charge.

8 P. M.—The Coal Resources of Ohio and Their Future Exhaustion, F. A. Ray, Prof. of Mine Engineering, O. S. U.

FRIDAY, FEBRUARY 13.

9:30 A. M.—Moving Picture Lecture on Bitulithic Pavement Construction, in University Chapel.

Montana Institute of Municipal Engineers.

The second annual meeting was held at Great Falls, January 19 to 21. The following officers and directors were elected: President, F. C. Snow, Bozeman, Montana; Vice-President, C. W. Helmick, Helena, Montana; Secretary-Treasurer, C. C. Widener, Bozeman, Montana. The above officers with the two following are the directors: William M. McLean, Lewistown, Montana; M. L. Morris, Great Falls, Montana.

The program was as follows:

January 19, morning—Organization, reading of minutes, secretary's report, President's address; afternoon, trip to Smelter Plant; evening, social session.

January 20, morning—Water Filtration for Montana Cities, M. L. Morris; Everyday Problems, C E. Durland; Needed Legislation, C. W. Helmick. Afternoon—Trip to the dam at the Great Falls; evening, social session at Elks Club or Opera House.

January 21, morning—Sewage Disposal for Montana Cities, A. L. Jaqueth; What I Learned About Good Roads at Detroit, William Jordan, Jr.; Paving, C. C. Widener.

Texas Good Roads Association.

About 1,500 delegates and visitors attended the annual meeting at Fort Worth, Jan. 26-28. A number of resolutions were adopted expressing the sense of the meeting, among which were the following:

Favoring a constitutional amendment permitting counties and good roads districts to issue road bonds on a majority vote instead of a two-thirds vote.

Urging the legislature to establish a state highway department headed by a state highway engineer and that liberal funds be provided for it.

Framing a plan by which state convicts could be used in road building.

Asking that the United States government build a military highway between El Paso and Brownsville along the Mexican border.

An inspection of Tarrant county's highway system was made.

The nominations committee consisted ing of J. A. King, Albany; E. E. Edwards, Fort Worth; B. B. Buckeridge, Temple; G. W. Keeling, Camp county; A C. Odle, Meridian, submitted the following for officers, who were unanimously elected by the convention:

John D. Warren, San Antonio, president; W. G. Turner, Fort Worth, first vice president; Homer D. Wade, Stamford, secretary and treasurer; D. E. Colp, San Antonio, first assistant secretary and treasurer; R. J. Potts, Agricultural and Mechanical college engineer, advisory.

Vice Presidents—E. F. Lanham, Bell county; O. E. Dunlap, Ellis county; G. W. Keeling, Camp county; J. A. King, Shackelford county; J. W. Madden, Grayson county.

Directors—John D. Warren, San Antonio; E. E. Edwards, Fort Worth; Mason Maney, Pearsall; D. E. Colp, San Antonio; Homer D. Wade, Stamford; W. G. Turner, Fort Worth.

Board of Councilmen—G. W. Baker, Dallas; Tom W. Larkin, Beaumont; R. J. Potts, College Station; W. M. McFarland, Alpine; J. W. Warren, San Antonio; D. E. Colp, San Antonio; E. W. Kirkpatrick, McKinney; E. E. Edwards, Fort Worth; J. D. Stephenson, Hillsboro; D. B. Tally, Wichita Falls; "Split Log Drag" Hill, Cleburne; W. W. Sealy, Waco; James Rooney, Fort Stockton; Ben B. Cain, Eagle Pass; O. F. Sims, Paint Rock; J. C. Howerton, Cuero; C. H. McMasters, Galveston; Joe Hirsch, Corpus Christi; H. C. Odle, Meridian; Seth B. Holman, Amarillo; Homer B. Matthews, Houston; Col. D. P. Gay, Brownsville; F. W. Williams, Paris.

New England Water Works Association.

The regular monthly meeting will be held at Hotel Brunswick, Boston, Mass., February 11. The following papers will be presented: "A Deferrization Plant at Middleboro, Mass.," illustrated, by Robert Spurr Weston, consulting sanitary engineer, Boston Mass.; "Some Problems Connected with the Design of Small Water Works Systems," illustrated, by William S. Johnson, sanitary and hydraulic engineer, Boston, Mass.

Colorado Good Roads Associaton.

The annual meeting was held at The Antlers, Colorado Springs, Colo., Jan. 15-16. Among the papers presented were the followng: "The History of Road Building in Colorado," by F. L. Bartlett, Denver. "The Work of the State Highway Commission," by J. E. Maloney, Denver, secretary of the commission. "How to Finance Good Roads Building"; "Bond Issue vs. the Mill Levy," by Charles F. Tew, Greley; T. W. Kelly, Denver, and C. R. McClain, Canon City; "Federal Aid in Road Building," by W. Morrell, chief of forestry division, Denver; "Improvement, Construction and Maintenance of Public Highways," J. A. Whittaker, office of public roads, Washington; "Road Construction," T. J. Ehrhart, state highway commissioner; "Road Maintenance," R. H. Higgins, president county commissioners' assocation, Pueblo.

A resolution was passed favoring the levy proposition for state roads. The following officers were elected: E. E. Somers, president, Denver; Dr. H. P. Harlowe, Boulder, vice-president; W. H Emmons, secretary.

Under the half mill levy plan $500,000 annually would be raised.

Alabama Good Roads Association.

At a meeting of the executive committee at Birmingham, January 22, a movement was started to organize county good roads associations. Resolutions were passed urging the people to observe good roads days, August 14-16. It was decided to amalgamate with the United States Good Roads Association, of which Senator J. H. Bankhead is president and J. A. Rountree, secretary. President Craft will appoint 100 delegates for the convention to be held at Tulsa, Okla.

American Wood Preservers' Association.

At the tenth annual convention held during the last week, at New Orleans, La., the program, so far as it relates to wood paving blocks, was as follows: Report of Standing Committee on wood block paving, by Walter Buehler, chairman; "The Construction of Creosoted Wood Block Pavements," by R. S. Manley, president Creosoted Wood Block Paving Co.; "A Comparison of Wood Paving in Europen Countries and the United States" (illustrated by stereopticon views), by S. R. Church; "Results Obtained by Piling Creosoted Wood Blocks Closely in Cages and the Saving Effected Thereby," by R. H. White, president Southern Wood Preserving Co.; "New Type of Paving Block Plant," by J. B. Card.

The members of the standing committee on wood block paving are as follows: Walter Buehler (chairman), manager Creosoted Wood Paving Block Association; John T. Logan, president National Lumber & Creosoting Co.; R. S. Manley, president Creosoted Wood Block Paving Co.; A. E. Larkin, general superintendent Republic Creosoting Co.; A. M. Smith, superintendent Ayer & Lord Tie Co.

PERSONALS

Haines, Edward Jr., consulting and contracting engineer, Greenville, S. C., has been appointed city engineer of Orangeburg, S. C., a position which he held from 1906 to 1911.

Hammitt, Jos. O., New York City, has been appointed head of the Bureau of Fire Prevention by Commissioner Robert Adamson.

Hering & Gregory, consulting engineers, of New York City, have been retained by H. M. Waite, city manager of Dayton, Ohio, to make a sanitary survey of the city and to investigate and report on the best method of collecting and disposing of the refuse.

Roberts, W. J., former State Highway Commissioner of Washington, has been engaged by the Pierce and King County Commissioners to take charge of the improvements of the Stuck, White and Puyallup rivers, which include the building of a dam.

Smith, Francis P., chemical and consulting paving engineer, New York City, on January 29th delivered an illustrated lecture on "Plant, Highway and Laboratory Inspection of Bituminous Materials," before the Graduate Students in Highway Engineering at Columbia University.

Walcott, Henry P., Cambridge, Mass., has been appointed chairman of the Metropolitan Water and Sewerage Board, succeeding H. H. Sprague, resigned. T. M. Dwyer Waterfield has been appointed a member.

The following officials have recently been elected or appointed:

Plainfield, N. J.—President of council, G. S. Clay, has announced the following committees: Finance—Leighton Calkins, chairman; Richard A. Claybrook, Francis J. Blatz, Juan A. Babcock, John H. Cose; Streets—Francis J Blatz, chairman; Abiel D. Edgar, Cornelius Van Herwerden, Thomas F. Hylan, Richard A. Claybrook; Fire and Buildings—Abiel D. Edgar, chairman; Charles C. Graves, John H. Cose, Leighton Calkins, Theodore F. Martin; Public Affairs—Richard A. Claybrook, chairman; Juan A. Babcock, Charles C. Graves, Theodore F. Martin, Cornelius Van Herwerden; Police—Juan A. Babcock, chairman; Leighton Calkins, Abiel D. Edgar; Street Lighting—Thomas F. Hylan, chairman; John H. Cose, Francis J. Blatz.

Huntington, Ind.—Superintendent of Water Works—John Fulton; Superintendent Street Lighting—John Hier; Board of Public Works—C. A. Edwards, Dr. D. Yingling and John P. Kenower; Board of Health—Dr. B. H. B. Grayston, Dr. W. F. Smith and Michael Smith; City Engineer—Paul Latchem; Fire Chief—Henry O'Connell; Street Commissioner—Ed Smith.

Sharon, Pa.—Chief of Police—Frank Miller; Chairman of Council—H. M. Wilson; Secretary—C. B. Lartz; Street Commissioner—W. B. Waid.

Fall River, Mass.—Mayor Kay has made the following appointments: Water Commissioner—R. F. Haffenreffer, Jr.; Park Commissioner—R. H. Cook; Board of Health—Dr. Pierre Crispo; Tree Warden—Wm. Stevenson.

Huntington, Ind.—President Huntington County Commission—Jacob Vollmar; Secretary—T. H. Powell; Road Superintendent—David Shell.

Columbia, Pa.—President of Council—J. L. Wright, who was nominated by Chief Burgess W. S. Detroiler; Secretary—Stevenson; Borough Engineer—C. A. Hogentogler, reelected; Chief of Police—Samuel Campbell.

Holyoke, Mass.—Apointments by Mayor J. H. Wood: Member of the Board of Public Works—Thomas J. Lynch; City Solicitor—Thomas C. Maher; Member of the Board of Health—Dr. Frank A. Woods; Member of the Fire Commission—Sidney E. Whiting; Manager of the Gas and Electric Department—John J. Kirkpatrick; Playground Commission—Mary E. Hussey, A. A. Brooks and N. P. Avery; City Engineer—Timothy J. MacCarthy. Aldermanic Elections: City Physician—Dr. James B. Bigelow; Water Commissioner—Hugh McLean; City Messenger—William T. Walsh; Clerk of Committees—John C. Doran; Sinking Fund Commissioner—Stephen A. Mahoney; Member Board of Overseers—Henry H. Bausch; Assessor of Taxes—William G. Beaudro; Assistant Assessor—Michael J. Grady; Trustee Whiting Street Fund—Mrs. Kate Moynahan; Agents Holyoke & Westfield R. R.—John J. O'Neil, Fred A. Monat, Matthew B. Begley, John H. Harrington and John J. Garvey.

Paterson, N. J.—Mayor R. H. Fordyce has made the following appointments: Finance Commission—Samuel P. Farnum, Frank Van Cleve, Lawyer; Fire and Police Commission—Frank Frost, George B. Stinson; Board of Public Works—J. Traphagen Doremus, Thomas H. Milson; Board of Health—Franklin Van Winkle; Park Commission—J. Albert Van Winkle; Mayor's Secretary—John McCutcheon.

Mishawaka, Ind.—R. W. Gaylor, mayor-elect; George Nutt, clerk; W. L. Kimball, treasurer; R. H. Jernegan, attorney; Walter Michael, controller; F. V. Kretter, chief of police; Albert Buysse, fire chief; C. W. Doolittle, street commissioner; Charles Cole, city engineer; Board of Public Works—A. D. Warner, W. H. Tupper, T. B. McDonough; Common Council—At Large, M. F. Kerr, W. F. Kuss.

Bridgeport, Conn. — George M. Eames, president Park Board; C. S. Canfield, vice-president; B. F. Cooney, clerk; Henry Cliffe, superintendent.

Quincy, Mass.—City treasurer, John Curtis; city solicitor, Walter S. Pinkham; city clerk, Emery L. Crane; commissioner of public works, Moses Brown; chief engineer of fire department, Faxon Billings; dock and waterfront commission, Frank F. Crane, Dr. Francis, Jr.; park commissioners, Ira M. Whittemore, Walter Deacon, H. B. Chapman.

Woonsocket, R. I.—Health officer, Dr. William C. Monroe.

Cincinnati, O.—Frank S. Krug, city engineer.

Indianapolis, Ind.—By Board Public Works, Dennis J. Bush, street commissioner; Frank Staub, superintendent of construction.

Winchester, Ky.—Lorenzo Brookshire, chief of fire department.

Orlando, Fla.—Carl Jansen, city clerk.

The Dalles, Ore.—S. I. P. Pike, chief of police.

Phillipsburg, N. J.—Frank C. Kneedler, mayor; directors as follows: Public safety, Oscar Bates; streets and public improvements, Robert Howell; revenue and finance, Hector Britton; parks and public property, John Perdoe. The salary of the mayor was fixed at $1,500, and of the commissioners at $1,200 each. J. I. B. Reilly was elected attorney, and James L. Lomerson, treasurer. Mayor Kneedler has been town clerk for the past 24 years and has a wide reputation as an authority on municipal laws.

Barton, Ga.—D. A. McMillan, mayor.

Toledo, O.—George W. Fraser, fire chief.

Dickson, Tenn.—C. M. Turner, mayor.

Egg Harbor City, N. J.—Mayor George Mueller has appointed the following committees: Finance—R. Weiler, Charles Morgenweck, J. Albert; Street—Gus. Lehr, J. Lehneis, William Weber; Water and Light—William Weber, William Thoms, J. Lehneis; Fire—J. Albert, W. Thoms, C. Morgenweck.

Geneva, N. Y.—Frank K. Hardison, cimmissioner of health.

Louisville, Ky.—W. O. Head, member Louisville Water Board.

Paterson, N. J.—Charles D. Cooke, president Board of Public Works.

Swainsboro, Ga.—Board of Road and Revenue Commissioners, H. R. Smith, chairman; S. S. Moore, J. A. Chapman, J. M. Sutton and Anguish Durden. Each road district has one commissioner.

Salem, Ore.—Dr. O. B. Miles, health officer; Mark Savage, chief of Fire Department; Walter Skelton, City Engineer.

Arlington, Ga.—E. H. Rainey, mayor.

Richmond, Ind.—Lewis Sieroke, county highway supervisor.

Meridian, Miss.—M. L. Worrell, manager of water works; J. P. Powell, fire chief.

Sharon, Pa.—H. M. Wilson, chairman of Council.

Covington, Ky.—Mayor Phillips will be Commissioner of Public Affairs; Harry Percival, finance; Mason Hawk, public property; Theodore Kluemper, public works; Henry Schuler, public safety.

Rome, N. Y.—By Mayor H. Clayton Midlam: Theodore J. Mowry, member Board of Public Works; W. O. Jenks, Clerk Fire and Police Board; T. C. Broderick, clerk, Board of Health.

Toronto, Canada—Horatio Hochen, re-elected.

Hamilton, Canada—Mayor Allan, returned by acclamation.

London, Canada—C. M. R. Graham, re-elected.

Allendale, S. C.—J. M. Patterson, mayor.

NEW APPLIANCES

Edge Protector.

The Thompson Edge Protector Company, Woodward and Warren avenues, Detroit, Mich., have placed on the market a steel protector for the edges of curbing, steps, columns, platforms, etc. The design is simple as shown by the illustrations. The cross section shows an arc of 90 degrees, with the steel plate at the edges bent to conform about to the radii of a circle. Strips are cut from the radial portions of the sheet to serve as reinforcement. These strips or anchors extend alternately from one side then the other, extending nearly parallel to the wall lines.

The method of use on curbing or street work is simple. The protector strips rest on nails which are driven into the form at the proper distance from the top. To keep the protector at the proper angle other nails are driven through holes provided in the nosing. As the work is nearing completion, it should be thoroughly tamped to force concrete under the bar and drive out all water, thus leaving the protector embedded in solid concrete. Standard sections are 1¼ inches wide and eight feet long.

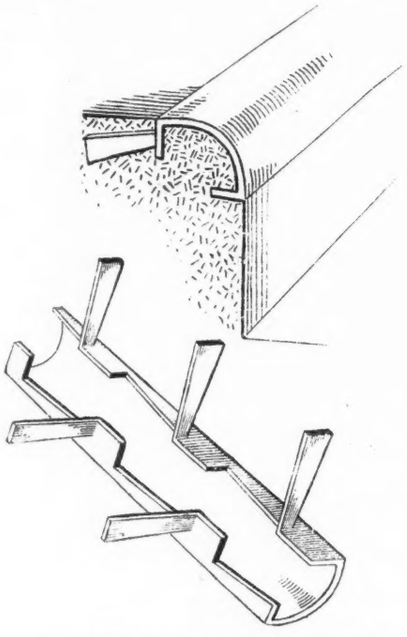
ACME CRUSHER

Lightness of Solid Steel Frame and the New Loading Conveyor Good Features for Portable Outfits.

The Acme Road Machinery Co., Frankfort, N. Y., were, we believe, the first manufacturers of the solid steel frame stone crusher. This innovation reduced the weight of the machine 40 per cent. with no sacrifice of strength and efficiency. The folding elevator, portable iron and stone feeding conveyor are other Acme inventions which have enlarged the field of portable crushing outfits.

The illustration shows a sectional view of the style D crusher. Within a solid steel frame (A) is a jaw (C) pivoted on a shaft (S). To this jaw a reciprocating movement is imparted by the adjusting plate (K), which in turn is moved by the lever (B) pivoted on the shaft (T) and raised and lowered by the single eccentric (P) running against the anti-friction roller (Q).

Particular attention is called to certain features of the general design of this crusher. First, may be noted, the tension rod (M-I), which, acting directly on the lever (B) insures perfect contact of the eccentric (P) and roll (Q) during each complete revolution, thus avoiding the pounding of these parts, common to the older machines of this type. Second: As the position



THOMPSON EDGE PROTECTOR.

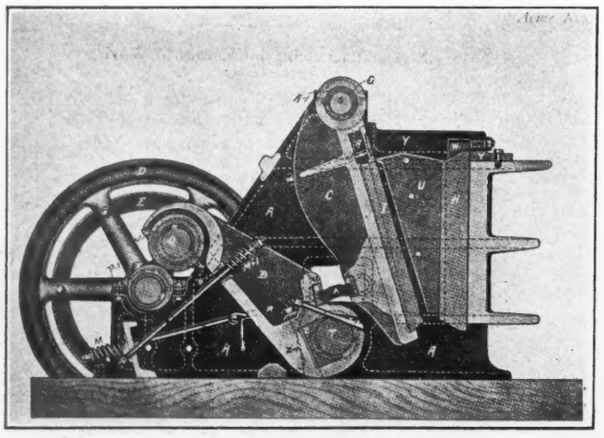
of the toggle (K) will indicate, the motion imparted to the jaw (C) by the lever (B) is transmitted along a line coincident with the center line of bearings (L-I) and toggle (K). From this it will be seen that the toggle (K) will travel to a point equally distant each side of the center line, and that this motion permits of uniform wear on the seats (L-L) and tends to remove danger from splitting of these parts due to the power being transmitted diagonally across them.

It will also be noted in this connection that the power is applied nearer to the lower point of the jaw, and that by reversing the seats (L-L), and raising the toggle, the travel of the jaw is increased, which increases the capacity of the machine on soft stone.

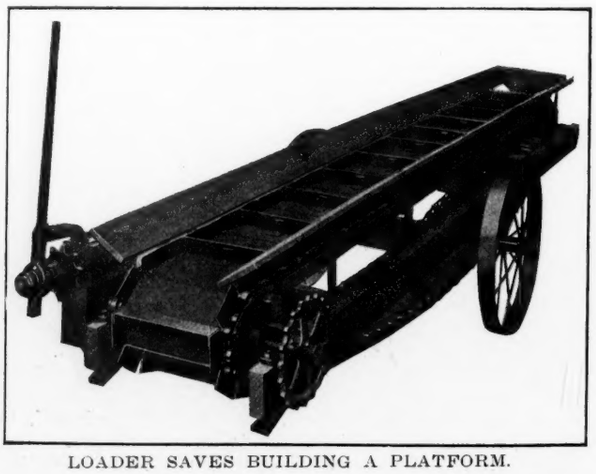
The adjustable bushing (Z) on shaft (T) and the split cap (A-I) on top of frame are features of the general design worth special notice. These pieces are of the same material as the frame casting (open hearth steel) and greatly simplify the removal of both lever and jaw when repairs to these parts become necessary.

The casting (Y) is a separate piece which is attached directly to the frame (A) and serves as a connection for the cast-iron hopers, which may be furnished with the machine, as welll as to materialy increase the depth of crushing hopper and prevent wear of main frame. This hopper casting also furnishes a simple and effective means of holding the stationary plate in place.

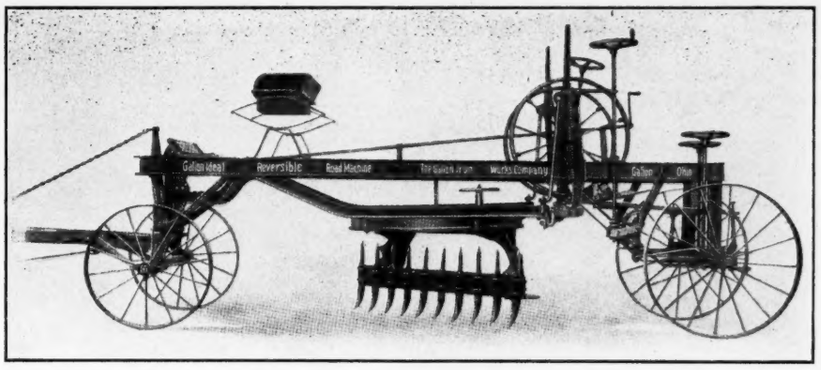
The feeding conveyor carries stone from the ground and delivers into the crusher hopper without the necessity of a platform over crusher. Driven by worm gear, sprocket chain and positive clutch, power being supplied by elevator counter shaft. A hopper is necessary with conveyor. To hopper is fastened a platform on which operator stands. In front of him is a lever for stopping and starting the conveyor, whether light or loaded. Will increase the average crushing capacity 25 per cent. on account of the uniformity of feeding. Substantially built, and mounted on two wheeled truck which may be hitched behind the crusher for transportation. Can be set up ready for use in a few minutes. Useful in handling crushed stone from car to wagon.



SECTIONAL VIEW OF ACME CRUSHER.



LOADER SAVES BUILDING A PLATFORM.



GALION ROAD MACHINE WITH SCARIFIER ATTACHMENT.

GALION SCARIFIER ATTACHMENT.

Converts Ordinary Road Machine into a Scarifier.

The Galion Iron Works Co., Galion, O., make an attachment for their Ideal or Universal road machines which very much extends their field of usefulness Though used incidentally for other purposes, the main use for a road machine is to scrape the sides of a dirt road and work the material towards the center, thus forming a proper crown for the road. The new attachment is a scarifier which is mounted in the position of the blade of the road machine. This adapts the machine to the reconstruction of gravel and macadam roads. The teeth of the scarifier cut into an old macadam surface loosening it up so that it can be crowned with the scraper.

The scarifier attachment consists of a heavy steel angle, to which are attached a set of ten heavy high carbon crucible steel teeth, measuring 1x2 inches in section, carefully shaped, curved and sharpened. These are attached to the angle, which, by means of heavy angle brackets, is attached to the road machine where the mold board has been removed. The teeth are double pointed, hence reversible. The scarifier can be fitted to road machines of other than Galion manufacture.

Walker's Pavers' Clamps.

The Frazier Machine Company, McKeesport, Pa., has placed on the market a device for handling brick from the side of the street under construction to the paver, which is claimed to have advantages over the ordinary brick carrier, the roller conveyor or the wheelbarrow. The general design of the tool, called Walker's Pavers' Clamps, is shown in the illustration. It has some of the features of the ordinary brick carrier. However, the piles of bricks are carried vertically; hence, more conveniently. The principle of the ice tongs is employed. The weight of the bricks presses the blades against the ends of the bottom brick, so that the load cannot be dropped. On setting the load down the bricks are released.

The Walker clamp was tried out in McKeesport by Bowman Bros., paving contractors, before they were placed on the market. These contractors had been using a roller conveyor.

WALKER BRICK CLAMP.

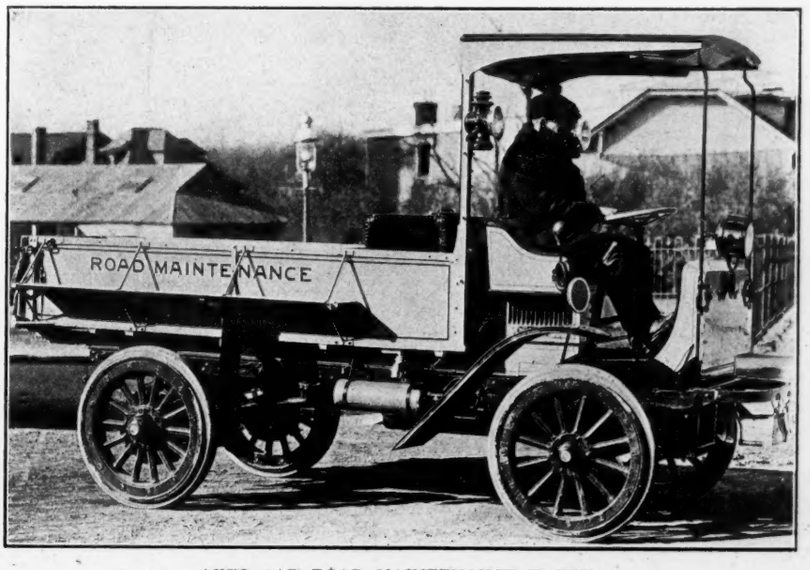
In laying a brick pavement, men or boys arrange the brick in upright tiers on the curb. The man carrying them puts the clamps over the pile and places it where wanted by the paver. The average distance that brick have to be carried is quite short. For a 30-foot street the average distance is only 7½ feet—three or four steps. For a highway it is even less. The clamps automatically adjust themselves to any size paving brick or block, carrying them on edge or on flats as desired by pavers. The saving, as compared with hand work, is said to be 40 per cent.

ROAD MAINTENANCE AUTO CAR

Motor Wagon of Special Design Has Advantages Over Wagons in Bituminous Road Repairs.

The patrol system of caring for roads which in the past at least has been so successful in Europe does not work very well under American conditions. A gang of men caring for a long stretch of road can do better than individuals working on short sections. A squad of men must have a vehicle to bring them material, carry their tools about and at times furnish transportation for themselves. Carts or wagons answer this purpose very well under some circumstances. However, to meet conditions where a gang has to take care of small repairs at many points over a considerable mileage of roads, conditions which usually exist where roads are paved with bituminous macadam or concrete, the Auto Car Company of Ardmore, Pa., to meet the requirements of an Eastern road commissioner designed the car shown in the illustration. One of these cars has taken the place of several horse-drawn vehicles at a saving of teaming cost and labor.

The road maintenance Auto Car has a tank in the forward part, designed to contain a bituminous binder which is kept in a liquid state by the application of heat from a device connected to the forward end of the muffler and to the lower part of the tank. The body is divided into a number of convenient compartments.



AUTO CAR ROAD MAINTENANCE TRUCK.

INDUSTRIAL NEWS

Cast Iron Pipe.—Chicago. Tonnage is materializing in nearly normal quantities. Quotations: 4-inch, $27; 6 to 12-inch, $25; 16-inch and up, $24. Birmingham. Manufacturers report much better conditions. Shipments are heavy. The outlook is better than it has been in months, and the inquiry from municipalities is greatly improved. Quotations: 4-inch, $22; 6-inch and up, $20. New York. Volume of business is steadily increasing. Municipal and private inquiry is good. Prices are hardening. Quotations: 6-inch, carloads, $22 to $23.

Lead.—Market is active. Quotations: New York, 4.10c.; St. Louis, 4.025c.

The New Departure Manufacturing Company, of Bristol, Conn., will shortly occupy its large and handsome Administration Building, which has been in the course of construction for the past twelve months.

The phenomenal growth of this company in the past few years has made it necessary to frequently provide large additions to its manufacturing facilities. The demand for New Departure Ball Bearings has increased so rapidly that the company could not longer defer the erection of necessary additions and therefore bought out the extensive plant of the Whitlock Coil Pipe Company, at Hartford, comprising 145,000 square feet of floor space. It was not long before still further additions became imperative. Office quarters were also insufficient, and it was decided to provide adequate facilities by the erection of this building. It is 62 feet wide, 220 feet long, and six stories high.

The building is a modern and absolutely fireproof structure.

The outer walls are of light gray tapestry brick, in three shades, relieved by broad bands of blue and green colored tiles in panel effect at the second and fifth stories. The front entrance is approached by a broad flight of granite steps and over it is a large copper marquise.

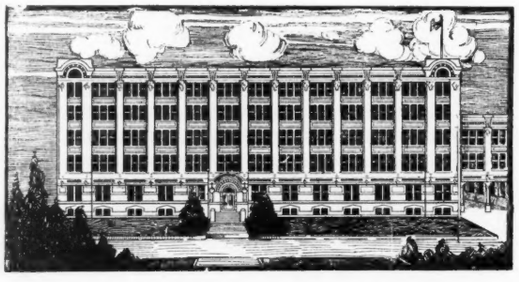
The office is located on the fifth floor. An electric elevator runs from the lobby of the building to that of the office.

At the front and south side are located the private offices of the officials and heads of departments. These are finished with panels of mahogany carried up to the height of the window sills. The partitions between the general office are of plate glass above the wainscot. The floor is tile, and the ceilings have a simple Greek cornice worked out in ornamental plaster in delicate shades of cream and apple green, which softens and intensifies the light. At the west side is a double fire and burglar-proof vault of two stories. All equipment in this vault is steel and absolutely fireproof. The entrance to the vault is guarded by modern fire and burglar-proof doors of steel. A feature of the main office is the large leaded glass dome ceiling light, running 112 feet long and 16 feet wide. This is supported on pilaster columns of the Doric order. The colors in the dome are opalescent greens and ambers which catch and diffuse the sun's rays without causing shadows

On this floor, in addition to the general office, is a large foreman's conference room with a small kitchen attached, equipped for serving luncheons

All office furnishings are mahogany and the workers in each department are immediately opposite the private office of the head of that department

The remainder of the building will be occupied principally in the inspecting and assembling of the company's product. The first floor will be given over entirely to shipping and receiving.



ADMINISTRATION BUILDING, NEW DEPARTURE MFG. CO.

The company this year enters upon the first days of the second quartocentenary of its existence. Something like twenty-five years ago the New Departure Manufacturing Company started business in a small room containing less than 60 square feet, and to-day it is occupying nearly that many square acres, with several millions of dollars invested in machinery operated by two thousand skilled mechanics, and busy day and night the greater part of the time. It is one of the most thoroughly equipped manufacturing plants in America. One entire building is devoted exclusively to the scientific study and analysis of steel and manufacturing processes. This building is equipped with chemical, metallurgical and physical testing laboratories, outfitted with the most modern apparatus.

Beginning January first, changes were effected in the organization which will still further develop the plant to its many possibilities. Albert F. Rockwell, who was one of the founders of the company, and whose genius has developed the patents covering the company's product, has been relieved of certain managerial detail but continues his duties as president.

De Witt Page, who has also been identified with the company almost from its inception, and in later years as secretary, sales manager, purchasing agent and advertising manager, has been appointed general manager. Mr. Page is well known to the trade and brings to his position unusual abilities and a knowledge of the company's affairs in production and promotion that specially qualifies him for the position.

Charles T. Treadway, who for some years past has been treasurer of the company, continues in that capacity but also becomes chairman of the board of directors, and in that capacity becomes an important factor of the future development of this most successful New England manufacturing enterprise.

Cement.—The Canada Cement Company, Ltd., Montreal, Canada, have sent a circular to their customers saying that they have decided to close down for the balance of the year 1914, or until further advised, Plants No. 6, Marlbank, Ont.; No. 7, Lakefield, Ont.; No. 9, Shallow Lake, Ont., and No. 10, Calgary, Alta. Therefore they will not be prepared to receive shipments of empty bags returned to any of these mills after February 1. Returns made to any of the other mills will have prompt attention.

Granitoid Concrete Street Pavements.—The name of the well known firm of Rudolph S. Blome Co. of Chicago, Ill., and various branch offices, pioneers in concrete paving and concrete building construction, has been changed to Blome-Sinek Co., all other features remaining unchanged. This firm is the inventor and owner of the patented Granitoid and Granocrete Concrete Pavements, and of late is making special inducements to contractors and municipalities for the laying of its pavements on the basis of reasonable royalty charges, thereby enabling closer competition with the many cheaper and perhaps less durable forms of concrete paving now being laid.

Glutrin.—The Robeson Process Company, Pennington, N. J., has published a new booklet regarding glutrin, which explains its nature and action. A number of excellent reproductions of roads on which glutrin has been used is included. Glutrin is a liquid of vegetable origin of a dark brown color of about the consistency of molasses but not of an oily or bituminous nature. It is a powerful mechanical binder, but this is only incidental, its principal action being chemical. Vegetable acids are stated to be the agencies through which the cementing effect is produced. These dissolve silica from the stone of a macadam road to which it is applied and redeposit it in the interstices between the stones thus cementing them together. When used with slag and clay the binding effect is particularly strong. As glutrin is soluble in water it can be applied in a sprinkling cart in a five or ten per cent solution. The photographs of roads that have been treated include the grounds of Princeton University, the Whitehouse grounds at Washington and a part of the Nelson avenue, Columbus, the Ohio experimental road.

ADVANCE CONTRACT NEWS

ADVANCED INFORMATION
BIDS ASKED FOR

CONTRACTS AWARDED
ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
			STREETS AND ROADS	
Minn.,	Nevish	2.30 p.m., Feb. 7	Grading and filling about 2½ miles of road	C. A. Dietel, Twn. Clk.
N. Y.,	Buffalo	11 a.m., Feb. 7	Paving and repaving various streets	F. G. Ward, Comr. Pub. Wks.
Iowa,	Pocahontas	Feb. 7	Paving 6 miles road	Trus., Lincoln Twp.
Ind.,	Harrison	10 a.m., Feb. 7	Constructing gravel road	Comrs., Delaware County.
Ind.,	Muncie	10 a.m., Feb. 7	Constructing gravel road	F. M. Williams, Aud.
N. J.,	Red Bank	8 p.m., Feb. 8	Street paving, 1,172 yds	A. H. Harris, Boro. Clk.
Mo.,	Joplin	Feb. 8	Seven blocks of asphaltic concrete pavement	V. C. Yantis, City Clk.
N. J.,	Alpha	2 p.m., Feb. 9	Constructing concrete curb and gutter	T. Pfeiffer, Ch. Str. Com.
O.,	Shaker Heights	Feb. 9	**Paving roads**	C. A. Palmer, Vil. Clk.
Mich.,	Saginaw	3 p.m., Feb. 9	Furnishing cement, gravel, crushed limestone	J. W. Ederer, Co. Rd. Comr.
Mont.,	Great Falls	Feb. 9	Concrete sidewalk, curb and curb construction	W. H. Harrison, City Clk.
N. J.,	E. Orange	8 p.m., Feb. 9	Furnishing and applying 275,000 gals. non-asphaltic road oil	L. E. Rowley, City Clk.
Wis.,	Milwaukee	10.30 a.m., Feb. 9	Furnishing 14,000 cu. yds. crushed stone; 3,500 cu. yds. gravel and slag	Dept. Public Works.
Minn.,	St. Paul	8 p.m., Feb. 9	Constructing brick gutters	M. E. Stone, City Clk.
Ind.,	Ft. Wayne	10 a.m., Feb. 10	Constructing township road	C. H. Brown, Aud.
Ind.,	Frankfort	Feb. 10	Constructing 10 roads	Clinton Co. Comrs.
Md.,	Baltimore	Feb. 10	Constructing 19.05 miles roads	W. L. Marcy, Sec. State Rd. Com.
Iowa,	Clinton	Feb. 10	Road improvement, various materials	T. G. Thorne, City Engr.
Ia.,	Waukon	Feb. 10	21,000 sq. yds. vit. brick pavement	J. T. Cowan, City Clk.
Ind.,	South Bend	10 a.m., Feb. 10	Grade curb and walk on one street	Dept Pub. Wks.
La.,	De Quincey	Feb. 10	Constructing 82,000 sq. ft. concrete sidewalk, and 18,000 cu. ft. of curb	City Clk.
Minn.,	Mankato	Feb. 10	Graveling state road, about 3,279 yds	C. L. Kennedy, Co. Aud.
Pa.,	Uniontown	noon, Feb. 11	**Constructing brick road**	T. H. Hudson, Co. Solicitor.
N. Y.,	Brooklyn	11 a.m., Feb. 11	Furnishing and delivering asphalt paving block, binder stone, asphalt, sand, paving pitch, etc	L. H. Pound, Pres.
O.,	Cleveland	noon, Feb. 11	Furnishing and delivering treated wood paving block	A. R. Callo, Comr. of Pur. & Sup.
Ia.,	West Union	Feb. 12	About 28,000 sq. yds. paving, various materials	B. P. Camp, City Clk.
O.,	Cleveland	noon, Feb. 12	Asphalt cement and asphalt mixing plant	A. R. Callo, Comr. Pur. & Sup.
Tenn.,	Madison	10 a.m., Feb. 12	Improving and repairing public roads	E. G. Buck, Co. Eng.
N. Y.,	Rome	Feb. 13	Highway construction	City Clerk.
N. Y.,	Lockport	1 p.m., Feb. 13	Road construction 5.92 miles	State Hwy. Comr.
N. Y.,	Albany	10 p.m., Feb. 13	Constructing roads in several counties	J. N. Carlisle, Hwy. Comr.
Ia.,	Sioux City	Feb. 14	Five miles concrete paving at estimated cost $100,000	P. J. Wells, City Clk.
Ill.,	Taylorsville	Feb. 15	Nine miles brick pavement on concrete base, cost $180,000	J. W. Dappert, Engr.
S. D.,	Sioux Falls	9 a.m., Feb. 16	Paving	W. C. Leyse, City Aud.
Ind.,	Kentland	1 p.m., Feb. 16	Constructing macadam road; estimated cost, $15,599.40	Comrs., Benton & Newton Co.
Ind.,	Fowler	1 p.m., Feb. 16	Macadam road	S. R. Sizelove, Co. Aud.
Pa.,	Wilmerding	Feb. 16	Grading, repaving and recurbing	W. E. Horrocks, Boro. Clk.
Md.,	Easton	noon, Feb. 17	Constructing highway, 1½ miles	J. B. Harrington, Clk.
Minn.,	Bemidji	2 p.m., Feb. 17	Constructing rural highway, 45.11 miles	J. L. George, Co. Aud.
N. D.,	Rugby	10 a.m., Feb. 17	Quantity of road machinery	H. Albertson, Co. Aud.
Minn.,	Crookston	10 a.m., Feb. 18	Grading, turnpiking and clearing portion state road	H. J. Welte, Aud. of Polk Co.
Minn.,	Winona	Feb. 18	Completing three concrete state highways	C. W. Anding, Co. Aud.
Ind.,	**Plymouth**	**Feb. 18**	**Constructing roads**	**G. F. McCoy, Aud.**
Ind.,	Culver	Feb. 18	Constructing 1 mile of brick road	T. F. McCoy, Co. Aud.
Mich.,	Flint	3 p.m., Feb. 19	80,000 sq. yds. pavement; estimated cost, $200,000	E. C. Shoecraft, C. E.
O.,	Upper Sandusky	Feb. 19	Grading and stoning road	Co. Comrs.
Pa.,	Paterson Hgts	Feb. 19	4,000 sq. yds. of paving	Borough Council.
Ind.,	Marion	10 a.m., Feb. 19	Furnishing 1 steam road roller	W. T. Patten, Aud.
Ia.,	Keokuk	6 p.m., Feb. 20	Curbing, paving, etc., various materials	City Clerk.
O.,	Cincinnati	Feb. 20	Furnishing and delivering crushed stone	Co. Comrs.
O.,	Newark	Feb. 20	Constructing 12 miles of National pike; cost, $250,000	Licking Co. Comrs.
O.,	Toledo	10 a.m., Feb. 20	Furnishing and delivering macadam and other materials for road repair	C. J. Sanzenbacher, Aud.
Minn.,	Crookston	Feb. 24	Paving 6,527 sq. yds. with Westrumite asphalt	L. Ellington, City. Clk.
Fla.,	St. Augustine	Noon, Feb. 24	Paving 64 miles; various materials	Clerk of Board.
O.,	Ottawa	noon, Feb. 29	Constructing various stone roads	J. E. Roose, Co. Aud.
Tex.,	Mineral Wells	Mar. 1	Macadam road; cost, $55,000	G. S. Steward, Mayor.
N. J.,	Plainfield	Mar. 2	Furnishing crushed stone, crosswalks and curbing	City Clk.
Mont.,	Plentywood	2 p.m., Mar. 4	Furnishing 12 road slips, 5 road piles, 1 grader, 1 road drag, 4 4-wheeled scrapers, etc	B. H. Johnson, Clk. & Rec.
Mont.,	Billings	Mar. 17	18,500 yds. of paving	L. E. Torrence, City Clk.
Minn.,	Fergus Falls	2 p.m., Mar. 24	Certain road tools and machinery	W. Lincoln, Aud. of Otter Tail Co.
			SEWERAGE	
Tex.,	Houston	2 p.m., Feb. 7	Constructing storm sewer	B. Campbell, Mayor.
N. J.,	Asbury Park	8 p.m., Feb. 9	Furnishing tools, cement, jute, brick and other materials required for laying 600 ft. of 8-inch sewer	S. H. Calvert, City Clk.
N. J.,	Bogota	8 p.m., Feb. 9	Constructing 4.4 vit. sewers, with two disposal plants, etc	H. P. Ross, Boro. Clerk.
Minn.,	Kelliher	9 p.m., Feb. 9	Laying sewer main, disposal plant, etc	City Clerk.
Minn.,	Mankato	Feb. 9	Constructing storm sewer; cost, about $8,000	City Clerk.
Ind.,	South Bend	10 a.m., Feb. 10	Pipe sewer on three streets	Dept. Pub. Wks.
Ia.,	Clinton	Feb. 10	Sewers	City Clerk.
Ia.,	Lamoni	Feb. 10	Constructing sewer with Imhoff tank, cost $20,000	J. F. Jones, Twn. Clk.
N. J.,	Trenton	2.30 p.m., Feb. 10	Furnishing materials and labor for three concrete cross drains and retaining wall	John Power, Dir.
Ia.,	Kingsley	Feb. 10	Constructing 8, 10 and 12-in. vit. pipe sewer; sewer outlet and purifying plant	R. E. Rieker, Town Clk.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES
O.,	Cincinnati	noon, Feb. 11..	Constructing main and lateral sewers	P. Fosdick, Dir. Pub. Serv.
N. Y.,	Brooklyn	11 a.m., Feb. 11..	Furnishing and delivering 700 tons quicklime and manhole covers, etc	L. H. Pounds, Pres.
Mass.,	New Bedford	8 p.m., Feb. 11..	Installing equipment in screen house	Mayor.
N. Y.,	Fairport	Feb. 11..	Constructing intercepting sewer and disposal plant	R. L. Williams, Vil. Clk.
Ia.,	Sioux City	Feb. 14..	Sanitary sewer in various streets	P. J. Wells, City Clk.
Wis.,	Fond du Lac	Feb. 15..	vit. pipe sewer, 1½ miles, 8 to 18-inch	J. F. Honchsee, City Clk.
Kan.,	Council Grove	Feb. 15..	Constructing 8-inch vit. pipe sanitary sewer; cost, about $16,000	M. W. Perry, City Clk.
Minn.,	Ortonville	Feb. 16..	Constructing sewer system	E. Scheibe, City Clk.
Min.,	Hibbing	Feb. 16..	5,000 ft. 8-in. vit. sewer pipe	P. R. Thomas, Sec. Park Bd.
N. J.,	Newark	2 p.m., Feb. 17..	Constructing outfall pressure tunnel	Passaic Valley Sew. Comm.
Minn.,	Kelliher	Feb. 24..	Constructing sewer and disposal plant	A. B. Kobe, Vil. Rec.
Mont.,	Butte	5 p.m., Mar. 1..	Sanitary sewer	W. A. Willis, City Clk.
Ark.,	Blytheville	Mar. 1..	Constructing sanitary sewer; cost, $60,000	H. C. Houston, Engr., Memphis, Tenn.

WATER SUPPLY

Cal.,	Manhattan Beach	8 p.m., Feb. 7..	Constructing municipal water works	C. E. Jenkins, City Clk.
Ky.,	Taylorsville	Feb. 7..	Water works system	J. H. Reid, Mayor.
O.,	Shaker Heights	Feb. 9..	Constructing water mains	C. A. Palmer, Vil. Clk.
Ia.,	Eagle Grove	7.30 p.m., Feb. 9..	Constructing city well	S. Middletown, Clerk.
Tex.,	Temple	6 p.m., Feb. 10..	2,556 ft. 6-in. c.-i. pipe and 1,500 lbs. specials	City Clerk.
Md.,	Gambrills	Feb. 10..	Drilling and testing wells	Bureau of Sup. & Acts., Navy Dept., Washington, D. C.
O.,	Columbus	Feb. 10..	Cast-iron valves, boxes, special castings etc	S. A. Kinnear, Dir. Pub. Serv.
N. Y.,	Cobleskill	2 p.m., Feb. 11..	Installing mechanical pressure filter	J. L. Fuller, Chr. Bd. Water Comrs.
Md.,	Baltimore	Feb. 11..	Furnishing gate valves	E. B. Whitman, Water Engr.
N. Y.,	Williamson	Feb. 11..	Constructing water works	R. M. Cheetham, Ch. W. Com.
Pa.,	Meadville	noon, Feb. 11..	900 ⅝-in., 50 ¾-in., and 50 1-in. water meters; 19 water meters, various sizes	Water and Light Dept.
O.,	Greenville	noon, Feb. 12..	Constructing water main extension	H. D. Hoel, City Clk.
Tex.,	El Paso	Feb. 12..	Furnishing steam-driven plunger pump, cap. 4,000,000 gals.; one or more power pumps, cap. about 3,000,000 gals.; centrifugal pumps, air compressors, etc	City Clerk.
Neb.,	University Place	Feb. 14..	Constructing well and furnishing castings	C. Gate, City Clk.
W. Va.,	Wheeling	Feb. 16..	Drilling water wells; cost, $5,000	Board of Control.
Mont.,	Columbus	Feb. 16..	Constructing water works system	G. A. Westover, Clerk.
Md.,	Baltimore	Feb. 18..	Equipping filtration plant	Board of Awards.
Minn.,	Graceville	Feb. 20..	Steel water tank and power	W. MacDonald, Vil. Rec.

LIGHTING AND POWER

Ill.,	Chicago	11 a.m., Feb. 9..	100,000 ft. twin wire, 40,000 ft. ½-inch rigid conduit, and 1,000 ft. ½-inch "T" type outlet boxes	R. Palmer, City Elec.
S. C.,	Lake City	Feb. 10..	Installing and equipping electric light plant	Bd. Comrs. of Public Wks.
D. C.,	Washington	Feb. 10..	1,790 ft. single-conductor cable, 300 desk lamps, 1 Duplex horizontal pump, etc.	P. J. Cowie, Paym'r Gen. U.S.N.
N. J.,	Jersey City	4 p.m., Feb. 10..	Furnishing and delivering two 150 h.p. horizontal tubular boilers; incandescent gas street lighting; 2,000 c.p. arc lamps, and metallic flame arc or magnetite lamp	M. I. Fagen, City Clk.
Ill.,	Chicago	11 a.m., Feb. 11..	Furnishing and installing elevator cables	L. E. McGann, Comr. P. W.
O.,	Cleveland	noon, Feb. 12..	Furnishing gas mantles, globes, and gasoline	A. R. Callo, Comr. Pur. & Sup.
N. J.,	Elizabeth	8 p.m., Feb. 12..	Installing complete electric power plant in school bldg	Bd. Education.
Va.,	Williamsburg	Feb. 13..	Franchise for electric light and power plant	City Clerk.
Mich.,	Kalamazoo	5 p.m., Feb. 16..	Engines, condensers, pumps, boilers, etc	C. L. Miller, City Clk.
D. C.,	Washington	Feb. 17..	7,510 ft. interior communication cable, 4 2-k.w. transformers, 1 storage battery car	Bureau Sup. & Ac. Navy Dept.
Cal.,	Mare Island	10 a.m., Feb. 17..	Furnishing quantity electric flash lamps	J. T. Cowie, Paymaster Gen., U. S. N., Wash., D. C.
O.,	Cincinnati	Feb. 23..	Completing electrical works in school building	Board of Education.
Neb.,	Omaha	4 p.m., Feb. 25..	Furnishing and erecting a pumping engine	R. B. Howell, Secy. Met. Water Dist.

FIRE EQUIPMENT

Iowa,	Clinton	8 p.m., Feb. 10..	Constructing fire station	City Clerk.
Mich.,	Detroit	noon, Feb. 10..	Furnishing 100 chemical fire extinguishers	C. A. Dade, Bd. Education.
Wis.,	Janesville	Feb. 10..	Furnishing 500 ft. hose	J. P. Hammerlun, City Clk.
Tenn.,	Nashville	10 a.m., Feb. 10..	Furnishing one motor combination chemical and hose car	H. E. House, Mayor.
Ill.,	Rock Island	10 a.m., Feb. 13..	One combination chemical and hose car	M. T. Rudgren, City Clk.
N. Y.,	New York	3 p.m., Feb. 13..	Warehouse, non-interference fire alarm system	Supv. Arch., Treas. Dept., Wash., D. C.
Tex.,	Waco	Feb. 17..	One motor combination pumping engine and hose wagon; 3,000 ft. hose	City Clerk.
Fla.,	Key West	Feb. 24..	1 motor fire engine, capacity 700 gals. per minute	City Clerk.

BRIDGES

Mich.,	Grand Rapids	10 a.m., Feb. 10..	Bridge construction	M. A. Spang Co. Comrs.
Minn.,	Luverne	Feb. 10..	Constructing 3 bridges	John Powers, Dir.
N. J.,	Trenton	2.30 p.m., Feb. 10..	Constructing reinforced concrete bridge	W. K. Newcomb, Clay Co. Clk.
Neb.,	Clay Center	Feb. 10..	Constructing six bridges	Comrs.' Court, Cameron, Tex.
Tex.,	Hearne	Feb. 11..	Repairing two bridges	J. Watson, Co. Judge.
Tex.,	Cameron	Feb. 11..	500-foot highway bridge	N G. Wallace, Co. Aud.
Ind.,	Terre Haute	Feb. 15..	Constructing 2 bridges, 20 and 34-foot spans	H. P. Frase, Co. Aud.
Ia.,	Des Moines	Feb. 16..	Constructing bridges	Sumter Co. Comrs.
Ga.,	Americus	9 a.m., Feb. 16..	Two reinforced concrete bridges	Comrs. of Calbot Co.
Md.,	Easton	Feb. 17..	Erecting two concrete bridges	T. F. King, Ch. Bridge Comn.
Tenn.,	Chattanooga	Feb. 18..	Bridge, $500,000	W. E. Leonard, Miner Co. Aud.
S. D.,	Howard	2 p.m., Feb. 19..	Constructing concrete and steel bridges for the year	Co. Comrs.
O.,	Youngstown	Feb. 20..	Constructing bridge; cost, $30,000	J. T. Nickerson, Furnas Co. Clk.
Neb.,	Beaver City	noon, Feb. 26..	Constructing steel or concrete bridge	A. L. Larson, Co. Aud.
S. D.,	Clear Creek	2 p.m., Mar. 4..	Constructing steel and concrete bridge	J. M. Caughell, Co. Sur.
Ore.,	Gold Beach	5 p.m., Apr. 9..	Reinforced concrete bridge to cost $35,000	

MISCELLANEOUS

D. C.,	Washington	10.30 a.m., Feb. 7..	Electric welding outfit, steel pipe, valve, flush pipes, etc.	Maj. F. C. Boggs, Gen. Pur. Off., Isthmian Canal Comn.
Ia.,	Burlington	2 p.m., Feb. 9..	1,000 bbls. Portland cement	F. W. Parrott, Co. Aud.
Minn.,	Anoka	4 p.m., Feb. 9..	Constructing armory building	Bd. Armory Supv., St. Paul.
Pa.,	Philadelphia	Noon, Feb. 9..	Furnishing 3-ton electric locomotive crane and electric hoist	G. W. Norris, Dir., Dept. Docks
Ill.,	Bloomington	noon, Feb. 10..	Furnishing and erecting 500 HP. water tube boiler	Supv. Arch., Wash., D. C.
Minn.,	St. Paul	11 a.m., Feb. 10..	Furnishing and delivering one automobile	H. P. Keller, Mayor.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Mont.,	Silver Bowl	noon, Feb. 10.	Constructing voting booths and ballot boxes	G. J. Stroome, Chr.
Pa.,	Philadelphia	noon, Feb. 10.	Waste disposal for 1914	M. L. Cook, Dir.
Mo.,	Booneville	3 p.m., Feb. 11.	Post office	J. J. Quinn, City Controller.
D. C.,	Washington	Feb. 11.	Installing automatic weighing and recording scale	H. S. Hamlin, Asst. Sec., Treas. Dept.
O.,	Cleveland	noon, Feb. 11.	Furnishing steam shovel	A. R. Callo, Comr. Pur. & Sup.
Ga.,	Savannah	noon, Feb. 12.	Furnishing six motor cycles	E. M. Frank, ex-Officio Judge.
D. C.,	**Washington**	**11 a.m., Feb. 14.**	**Two motor driven fire pumps; cost, $14,000**	**R. H. Stanford, Bur. Yds. & Docks, Navy Dept.**
Del.,	Fort du Pont	11 a.m., Feb. 15.	Air compressor in pumping station	Quartermaster.
N. Y.,	Lockport	Feb. 16.	Constructing incinerator plant and buildings	S. Beattie, City Clk.
N. Y.,	New York	Feb. 16.	Reconstructing Steinway Tunnel	ub. Service Comn.
B. C.,	Victoria	Feb. 16.	Erecting additions to post office, cost $100,000	R. C. Desrochers, Sec. Dept. Pub. Wks., Ottawa.
R. I.,	Providence	2.15 p.m., Feb. 16.	Constructing recreation building and making alterations	J. P. Gainer, Mayor.
Cal.,	Berkeley	Feb. 18.	Constructing post office	Supv. Arch., Treas. Dept., Washington, D. C.
W. Va.,	Wheeling	11 a.m., Feb. 19.	Furnishing 2,500 bbls. Portland cement	Maj. J. P. Jervey, U. S. A.
La.,	New Orleans	Feb. 26.	Brick building for pumping station	Sewage & Water Board.
Mich.,	Big Rapids	3 p.m., Feb. 28.	Constructing post-office	O. Wenderoth, Super. Arch., Washington, D. C.
Tex.,	Kingsville	noon, Mar. 1.	Erecting fireproof court house and hospital	Comrs. Court of Kleburg Co.
N. C.,	Raleigh	Mar. 2.	Erecting court house; cost, $224,000	City Clerk.
Mont.,	Helena	8 p.m., Mar. 2.	Two 600-gallon tank street sprinklers	E. J. McConnell. City Clk.
Pa.,	Philadelphia	noon, Mar. 2.	Constructing pier and bulkhead	G. W. Norris, Dir.
N. D.,	Williston	3 p.m., Mar. 9.	Constructing post-office	O. Wenderoth, Super. Arch., Washington, D. C.
N. J.,	Camden	8 p.m., Mar. 17.	Constructing timber bulkhead	F. S. Van Hart, Ch. Com. Wharves and Docks.

STREETS AND ROADS

Hamilton, Ala.—Citizens of Marion County have been invited to meet with Commissioners' Court on February 4 to discuss location of public roads. Large crowd is expected as each section of county wants distribution of $100,000 roads bonds.

Phoenix, Ariz.—Sentiment in southern Arizona is almost unanimous in favor of state road bond issue. In Pima County, according to Engineer Cobb, there is movement to issue $250,000 worth of county road bonds.

Scottsdale, Ariz.—Road will be built from Scottsdale to Tempe, a distance of six miles.

Napa, Cal.—At meeting of Supervisors proposition to bond county for $125,000 for good roads and bridges was submitted. Plan is to use $60,000 of this sum as Napa County's share for Black Point-Sausalito and Marin County highway. This road depends upon Marin and Sonoma Counties contributing $10,000 each.

Oakland, Cal.—City Engineer Perry Brown has been directed to prepare proceedings for improving 34th Ave., from the Foothill Blvd. to Galindo St., and Harmon Ave., between 62d and 64th Aves. Resolutions of intention to open and widen East 16th St. and the Foothill Blvd. from 22d Ave. to Sausal Creek.

San Francisco, Cal.—State Highway Commissioner has announced a $5,500,000 subscription to state highway system by 29 counties interested in proposed roadway. In return, commission will expend money with counties financing bond sales with which work will be done. With the bond sales that have already been made, State Highway Commissioner believes that coast road from San Diego to San Francisco will be nearly complete by time 1915 exposition is opened, as well as road north from San Francisco to Eureka, the west Sacramento Valley highway from Red Bluff to Benica, and part of artery from Bakersfield to Red Bluff by way of Fresno, Sacramento and Marysville. Subscriptions by counties to state highway bonds are, to date, as follows: Los Angeles, $695,000; San Diego, $557,000; Alameda, $500,000; Solano, $390,000; Contra Costa, $300,000; Solusa, $290,000; San Luis Obispo, $250,000; Santa Clara, $228,000; Glenn, $218,500; Kern, $200,000; San Mateo, $200,000; Orange, $200,000; Imperial, $200,000; Fresno, $150,000; Marin, $150,000; Sacramento, $150,000; Santa Barbara, $141,000; Tuolumne, $125,000; El Dorado, $150,000; San Bernardino, $105,000; Riverside, $100,000; Humboldt, $100,000; Stanislaus, $75,000; Santa Cruz, $75,000; Siskiyou, $50,000; Monterey, $45,000; Mendocino, $45,000; San Benito, $25,000; Shasta, $5,000.

Fairfield, Conn.—At next town meeting it is most likely that Selectmen will ask for appropriation for extension of beach road, which will probably complete job.

Wilmington, Del.—Arrangements are being made for sale of $150,000 bonds for street improvements.

DeLand, Fla.—DeLand is preparing for many improvements and J. N. Hazelhurst, of Atlanta, has prepared necessary preliminary estimates of cost of paving and grading the streets.

Gainesville, Fla.—It is expected that contract will soon be let for paving of Depot St., running parallel with Seaboard Air Line tracks, between West Main and Pearl Sts.

Winter Garden, Fla.—Town Council has passed on sidewalk specifications. The walks will be 5 ft. 6 in. wide, in resident sections, with 4-in. concrete foundations, consisting of crushed flint, sand and cement. Work will start as soon as contract is let on two miles of this walk.

Atlanta, Ga.—Street Committee is planning considerable improvements for this year.

Dixon, Ill.—East Chamberlain St. and North Jefferson Ave. will be paved with macadam.

Anderson, Ind.—Twenty-two sets of Madison County roads bonds, aggregating $83,300, bearing 4½ per cent. interest, have been sold to J. F. Wild & Co., of Indianapolis, at premiums of $562.98. They are gravel road bonds, except two, one for macadam road through Elwood, the other for brick road through Lapel.

Baltimore, Ind.—Petition has been presented to Mayor Preston, urging that Baltimore St. be paved with granite blocks from Broadway to Fremont Ave., and asking that Paving Commission reconsider its decision to pave thoroughfare with smooth material.

Hartford City, Ind.—Frank Dougherty is circulating petition which is to be presented to board of county commissioners asking improvement of Monroe St., with crushed stone, under three-mile road law. Petition requests that thoroughfare be paved from its south terminus at Ritter pike, south of town, to Kentucky Ave., north of the city.

Indianapolis, Ind.—Steps are to be taken by board of public works to place Kentucky Ave., from West St. to Oliver Ave., in good condition.

Lafayette, Ind.—At meeting of Board of County Commissioners petition of 175 West Side property owners will be presented asking that free gravel road be constructed under three-mile gravel road law from Salisbury St. at north corporation line to State St.

La Porte, Ind.—Mayer, Kiser & Co. and Fletcher American National Bank, of Indianapolis, were successful bidders for $46,400 road bond issue sold at public meeting in office of County Treasurer Johanni. The Mayer, Kiser company was awarded the $18,000 issue, bidding par, accrued interest and premium of $276. Remaining issues of $13,600 and $14,000 were awarded to Fletcher Bank at par, accrued interest and premium $366.

Shelbyville, Ind—Shelby County Council, at a three days' special session, has appropriated $17,625 for improvement of 47 free gravel roads in county.

South Bend, Ind.—St. Joseph County will join up with Elkhart County on Lincoln highway with wide curve at county line.

Clinton, Ia.—Bids will be received on Feb. 10 for two street improvements, consisting of following approximate quantities: 17,240 sq. yds. vit. brick, concrete with bituminous top coat, creosoted wood block or asphaltic concrete paving; also 7,800 lin. ft. combined curb and gutter. F. W. Leedham is City Clerk and J. G. Thorns is City Engr.

Council Bluffs, Ia.—Paving of South Ave. is being discussed.

Des Moines, Ia.—Paving of East 14th st. and Hull Ave. is being urged.

Coffeyville, Kan.—People of Coffeyville and those living in rural district west of city are to make demand upon Board of County Commissioners for good county road running in westerly direction through Tyro and Caney to Chautauqua County line.

Ottawa, Kan.—Resolutions have been adopted for grading, curbing and paving of Poplar and Oak Sts. A. H. Slater is Mayor.

Ottawa, Kan.—Board has passed resolutions ordering paving of Poplar St., from Fifth to Ninth, and Oak St., from Third to Sixth. Paving is to be macadam with asphalt or similar filler, Commissioners reserving right to use any kind of paving on intersections. Paving is to be 26 ft. wide, gutter to gutter, and gutters to be 25 ins. in width.

Salina, Kan.—Paving of East Walnut St., from Fifth St. to river, is being petitioned for.

Bowling Green, Ky.—Upon petition of certain voters filling requirements of law, County Judge Henry H. Denhardt has entered order calling for special election on Wednesday, March 25, to take sense of voters of county on issuance of $300,000 road bonds.

Winchester, Ky.—Extension of West Hickman St. is being planned.

Crowley, La.—The Police Jury of Acadia Parish will shortly advertise sale of issue of ten-year 5 per cent. bonds amounting to $170,000 for public highways.

Hammond, La.—Arrangements are under way to sell $75,000 of bonds recently voted in Road District No. 2 of Seventh Ward, and highway department of state engineers will begin survey of two roads, one north and south and one east and west through the district. It is confidently expected that by next fall there will be completed in this road district at least seventeen miles of as fine roads as may be found in South. Estimated cost is $5,000 per mile.

Jennings, La.—Jefferson Davis Parish is in market for model east-and-west highway, traversing its most populous section and connecting with good roads of Acadia Parish and model road now being constructed with the $900,000 voted by Calcasieu. State Highway Engineer H. C. Daigre has commenced surveys. One route leads from Mermentau, and other from Evangeline, through the Jennings oil field. His reports will be submitted to Police Jury.

New Orleans, La.—Two petitions for additional paving with bitulithic in connection with that to be done in Napoleon Ave., from Camp to Broad St., has been filed with Commissioner of Public Property E. E. Lafaye Tuesday. One is for paving of avenue on both sides, from Magazine to Tchoupitoulas, and the other is for paving of Broad St., from Napoleon Ave. to Washington St.

New Orleans, La.—Plan is being considered for more street improvements.

New Orleans, La.—All of bids for subsurface drainage, curbing, gutter bottoms and paving of Clouet St., from Royal St. to St. Claude Ave., have been re-

jected on recommendation of Commission of Public Property E. E. Lafaye, on account of irregularity in specifications. There were several bids, that of George B. Kelly being lowest, at about $2.11 per sq. yd.

St. Bernard, La.—People have voted in favor of special road tax for roads in parish.

Baltimore, Md.—Bids have been asked for paving of various streets under Contract No. 73.

Hagerstown, Md.—The Good Roads Commission of Maryland asks for bids for building of about two miles of road from Middletown on west. Advertisement states that bids and specifications may be obtained from office of Commission. Road will probably be built of concrete.

Holyoke, Mass.—Board of Pub. Works recommends adoption of permanent plan for extension of street improvements.

Bay City, Mich.—Formal action has been taken by Bay County Stone Road Commission to build one mile of concrete road from city limits of Bay City toward Kawkawlin, estimated cost to be $10,000.

Berrien Center, Mich.—Improvement of roads is being discussed.

Flint, Mich.—City will receive bids for about 80,000 sq. yds. pavement; estimated cost, $200,000. E. C. Shoecraft is City Engr.

Grand Rapids, Mich.—Board of County Commissioners have taken steps for an early start in building trunk line roads for which county elected to issue bonds. Notice for bids was ordered published for road running eastward from Grand Rapids to where main roads now fork east of Swan River. This is important stretch and will be among first to be looked after in spring.

St. Joseph, Mo.—About $80,000 worth of grading work has been arranged for 1914. The San Antonio road will also be graded from Cory mill through San Antonio, to east county line. Cost will be $40,000. There will be 10½ miles of this road, and it will be part of state road between Hannibal and St. Joseph.

Grand Island, Neb.—Petition is being considered for new paving district, planned to include 4th St. to Walnut, thence 4th to 1st and west to Madison.

Garwood, N. J.—The initial step has been taken by council to secure better streets.

Hammonton, N. J.—Edwin A. Stevens, State Road Commissioner, has visited this place, and in company with Freeholders Wm. L. Black and Cyrus F. Osgood, has gone over route of proposed new State road from Hammonton to Vineland. This road, which will be about 15 miles long, will probably commence at junction of 12th St. and Pennsylvania Railroad crossing, and take in that entire thoroughfare clear to its entrance into the Borough of Folsom.

Jersey City, N. J.—Elimination of Park Ave. crossing connecting East Rutherford and Rutherford is being planned.

Westfield, N. J.—Town Plan and Art Commission have received petition signed by over 50 property owners for straightening of North Ave., from Broad to Clark St. This would give direct road from Westfield to Plainfield on north side of Central Railroad and make excellent highway for automobiles from Elizabeth to Plainfield. In order to straighten road it will be necessary to purchase Cox property at Broad St. curve. This property could be purchased for $10,000.

Woodbury, N. J.—After visit to State Road Commissioner Stevens at Trenton a delegation of Councilmen and Freeholders believe that South Broad St. will be made state road, and that it will be improved at least partly at state expense.

Binghamton, N. Y.—Binghamton will have two more State pavements and contracts will be awarded by State at next letting, which is expected to be made some time in February.

Le Roy, N. Y.—A petition has been in circulation among citizens of Le Roy addressed to John N. Carlisle, of State Highway Commission, stating that it is desired by citizens that three-mile strip of road east of village between Le Roy and Livingston County be improved by having State road made during next summer.

Lockport, N. Y.—Plans and specifications for building of Wrights Corners-Olcott section of Lockport-Olcott road have been completed by state highway department office at Buffalo and have been forwarded to Commissioner Carlisle at Albany for contract letting. It is expected that bids will be called for within next week.

Saratoga, N. Y.—Board of supervisors has made additional appropriation of $1,200 to pay for State and county highway to be built on roads approaching village of Saratoga Springs. Pieces of highway to be improved are from Lincoln spring to Lincoln Ave. on south, and from Maple Ave. to Glens Falls State road on north.

Watertown, N. Y.—Statement of County Superintendent Henry S. Ball a few days ago that he had aprroved of plans and specifications for improvement of road in Washington St. to cemetery gates at Brookside and then on to Marvin's corners, and that contract would be let when next lot of roads were advertised, is confirmed by State Commissioner of Highways John N. Carlisle.

Charlotte, N. C.—City engineer has been instructed to submit estimate of cost of improving following streets which are slated for work by township trustees: Harrill, North Tryon, Rozzelle Ferry Road, Beatty's Ford Road, North Brevard St., Derita Road, Dowd Road.

Raleigh, N. C.—Department of Public Works is considering improvement of North Blount St., including building of gutters, 30 ins. wide of white concrete, giving contrast to dark asphalt concrete in center of street, and laying of concrete sidewalks across streets intersecting Blount, at border of latter.

Taylorsville, N. C.—Campaign has been launched in Alexander County for $100,000 bond issue for road improvements.

Dayton, O.—A change in route of old National Pike to include Dayton and proposed construction of road from Toledo to Cincinnati via Dayton, has been announced. The proposed road from Toledo to Cincinnati will be known as Road No. 7. There will be 12 main market roads built under supervision of good roads federation. Road No. 7, to pass through Dayton, is one of 12. Funds for this work will be provided by half-mill levy.

Mt. Vernon, O.—Ordinances have been made authorizing bond issues for various street improvements.

St. Marys, O.—Thirty thousand dollars worth of 5 per cent. improvement bonds for Brown Turnpike on Auglaize-Mercer County line, will be placed on market by joint pike commission of counties mentioned. Project covers five miles between Ft. Wayne and the Bethel Road intersections.

Toledo, O.—Notice is hereby given that Board of County Commissioners of Lucas County, Ohio, will sell to highest responsible bidder, $128,800 of said county's bonds, at its office in Toledo, Lucas County, Ohio, on Friday, the 13th day of February, 1914, and sealed bids will be received by County Auditor of said county for purchase of said bonds up to 10 o'clock a. m. Bonds are issued to provide stone and gravel road building fund. C. J. Sanzenbacher is County Auditor.

Urbana, O.—It is understood that three sections of state highway will be built this spring. A mile and a half will be constructed in Mad River Township connecting highway already constructed from foot of hill west of city on Urbana-Westville pike to river bridge and mile section through village of Westville. One mile will be built in Goshen Township from south corporation line of Mechanicsburg through Nashville on Mechanicsburg-London road. Third piece of highway to be constructed will be a mile of road in Salem Township from Snow Hill on north.

Youngstown, O.—Ordinance has been passed to pave and sewer Sheby St., also to pave Rice and Hillman Sts.

Eugene, Ore.—Seventeen blocks of streets have been ordered paved by City Council. Streets to be paved are those of large list recently proposed which have no remonstrance against them. They are: 4th Ave. west, from Charnelton St. to Blair; Monroe St., 26 ft. wide, from 11th St. to 13th; 10th Ave., from Pearl St. to Mill, and 9th Ave. east, from High St. to Alder St. A petition to pave Hilyard St. from 9th to 11th was received contingent upon the paving of 9th Ave.

Independence, Ore.—Polk County is considering bond issue of $200,000 for good roads.

Harrisburg, Pa.—Ordinance has been adopted to authorize opening and grading of 19th St., from Chestnut St. to Mulberry St.; 20th St., from Market St. to Chestnut St.; Mulberry St., from 18th St. to 19th St.; Hildrup St., from 18th St. to 20th St., and Chestnut St., from 18th St. to 19th St. C. A. Miller is City Clerk.

West Hazleton, Pa.—A special West Hazleton election, March 3, to vote on proposed bond issue of $50,000 for paving and sewer purposes has been ordained.

Anderson, S. C.—People of Anderson County may shortly vote on question of issuing $300,000 county bonds for good roads.

Sumter, S. C.—Liberty St. will probably be paved shortly between Harvin and Sumter Sts.

Sioux Falls, S. D.—Sealed bids for paving of Prairie Ave. from Third St. to Twelfth St., have been received, as follows: Hanlon & Oaks, Sioux City, Ia.—Asphaltic concrete, per sq. yd., $1.57; bitulithic, per sq. yd., $2.08: Dolarway, per sq. yd., $1.60; Tarvia macadam, per sq. yd., $1.30; all grading, per cu. yd., 60 cts.; stone headers, per lin. ft., 50 cts.; 6-in. drain tile, laid, per lin. ft., 10 cts. Warren Bros., Boston Mass.—Bitulithic pavement per sq. yd., $1.99; all grading, per cu. yd., 45 cts.; stone headers, per lin. ft., 50 cts.; 6-in. drain tile, laid, per lin. ft., 15 cts. Fielding & Shipley, St. Paul, Minn.—Asphaltic concrete, per sq. yd., $1.80; all grading, per cu. yd., 46 cts.; stone headers, per lin. ft., 53 cts.; 6-in. drain tile, laid, per lin. ft., 22 cts. Lincoln Construction Co., Lincoln, Neb.—Asphaltic concrete, per sq. yd., $1.98; Tarvia macadam, per sq. yd., $1.44; stone headers, per lin. ft., 48 cts.; 6-in. drain tile, laid, per lin. ft., 39 cts. C. H. Atkinson Paving Co., Watertown, S. D.—Asphaltic concrete, per sq. yd., cash, $1.48; asphaltic concrete, per sq. yd., certificate $1.51; bitulithic, per sq. yd., cash, $2.26; bitulithic, per sq. yd., certificate, $2.30; Dolarway, per sq. yd., cash, $1.45; Dolarway, per sq. yd., certificate, $1.49; all grading, per cu. yd., 45 cts.; stone headers, per lin. ft., 65 cts.; 6-in. drain tile, laid, per lin. ft. 30 cts. Motion was made and seconded that all bids for paving of Prairie Ave., from Third St. to Twelfth St., be referred to Commissioner Hardimon and City Engineer Howe.

Clarksville, Tenn.—There is deposited in local bank $20,000; there is also in United States Treasury at Washington $10,000 to be added to this amount and expended on road running from this city to Robertson County line. This road will, when completed, be known as United States Post Rd., county making appropriation of $20,000, or two-thirds, while government supplies other third, or $10,000.

Manchester, Tenn.—At special session of County Court resolutions were adopted favorable to $200,000 bond issue for road purposes, but calling of election was deferred until regular meeting in February.

Belton, Tex.—P. N. Eads, of Heidenheimer, has presented petition from his community to County Commissioners asking them to order election for $4,000 road bond issue for that section of county east of Heidenheimer and in Rogers Justice Precinct. Commissioners have granted election.

Corpus Christi, Tex.—Paving of Rail road Ave. has been authorized.

Corsicana, Tex.—City of Corsicana is now advertising for bids for 24,251 sq. yds. of street paving with concrete curbs and gutters. J. A. Harper is City Secretary.

Houston, Tex.—Estimate of cost of grading and grubbing Navigation Blvd. has been ordered by County Commissioners.

Houston, Tex.—Downtown Houston is to be repaired and paved. There will be approximately 54 blocks of improvements, running north and south from bayou to Lamar Ave., and running east and west from Crawford to Main Sts. Streets will comprise in neighborhood of 1,000,000 sq. ft.—more than 100,000 sq. yds. While no estimate has been made by engineering department, nor cost figured by officials, that expense will be beyond $200,000 is belief.

Houston, Tex.—The Navigation Boulevard, through Magnolia Park, will be graded and paved out of funds from $1,000,000 bond issue for roads and bridges. Cost of paving, grading and grubbing will be $13,935, according to estimate submitted. Boulevard is 1.8 miles long.

Lockhart, Tex.—J. J. Jansen, a road expert working under direction of Agricultural Department, will begin survey of roads to be built in this county. Mr. Jansen will personally superintend building of one mile of road and will draw up plans and specifications of roads to be built with $50,000 voted for that purpose some time ago.

Longview, Tex.—Nearly all arrangements for highway have been made from Dallas to Longview and thence to Shreveport and Texarkana, connecting with and soon making part of great national highway from east and northeast.

Marshall, Tex.—At adjourned meeting of County Commissioners election to vote on $30,000 good roads bonds was called and date set for Feb. 24.

New Braunfels, Tex.—Commissioners Court has applied money of bond issue on following first-class roads: New Braunfels-Austin and New Braunfels-San Antonio road, $20,000; New Braunsfels-Blanco road via Smithson's Valley, $25,000; Seguin road, $5,000; Fischer's Store road, $5,000; Marion road, $2,000; Schumannsville road, $1,000. $4,825 nas been appropriated for road machinery.

Racine, Wis.—Resolution has been adopted that Board of Public Works be instructed to advertise for bids for paving Grand Ave., from Seventh St. to Fourteenth St., in accordance with the plans and specifications adopted by Council.

San Antonio, Tex.—Paving bids of Parker-Washington Co., bidding through Foxhall P. McCormick, have been rejected by City Council, although these bids were admitted to be lowest.

San Antonio, Tex.—Council has appropriated $44,000 to widen tween Commerce and Houston Sts.; also $1,500 for widening of Rogers St., between Grayson and Quitman Sts.

Evansville, Wis.—A resolution ordering street and alley committee to prepare plans and specifications for paving of Main St., from C. & N. Y. Railway right of way to intersection of Main and Second Sts., in accordance with resolution already passed, has been adopted.

Racine, Wis.—City Council has decided to pave N. Wisconsin St.

CONTRACTS AWARDED.

Anniston, Ala.—Goodrich & Crinkley, Anniston, has been awarded contract by county commissioners for State aid road extension from Piedmont toward Jacksonville. Distance to be improved is approximately a mile and three-eighths and price will be about $6,000.

Hermosa Beach, Cal.—To Williams Bros., Chamber of Commerce Bldg., Los Angeles, at $33,963, for two sections of street improvements on Strand, including walks, cement curbs, and 82 lighting posts.

Los Angeles, Cal.—To Lynn S. Atkinson, 1118 Story Bldg., city, at $184,800, for lowering of Broadway tunnel grade between Temple St. and Sunset Blvd.

Roseville, Cal.—Burns & Da Rosa, of Sacramento, have been awarded contract for paving streets in this city that will be portion of state highway, the firm's bid being $17,000. It is provision of award that contractors accept $5,000 of city's bonds as payment. Nearly two miles of street will be built.

San Diego, Cal.—Bids for construction of highway from Lower Otay dam to Imperial valley road have been opened by the county supervisors. The Morse Construction Co., with bid of $14,625, was lowest bidder. J. W. Isbell Construction Co. had a bid of $14,754, and the Hyde Construction Co. of $19,370.

Connecticut.—By State Highway Comr., Hartford, for construction of gravel road (4,300 ft.) on Colebrook-Norfolk Road, in Colebrook, to Jos. Mascetti, Torrington, at $6,993; also for construction of about 6,650 lin. ft. of bituminous native stone macadam road on Ellington Road in Somers, to Amos D. Bridges Sons, Inc., Hazardville, at $10,366.

Bartow, Fla.—For constructing about 35,000 sq. yds. of vitrified brick, asphalt or bitulithic paving, also concrete curb and gutter, by City Council, to West Construction Co., Chattanooga, Tenn. Estimated cost is about $80,000. B. J. Orland is City Clk.

St. Petersburg, Fla.—For constructing brick road on 9th St., North, by Commissioners of Pinellas County, to Georgia Engineering Co., Augusta, Ga., and for concrete and culvert work, to Mutual Construction Co., St. Petersburg.

St. Petersburg, Fla.—To Georgia Eng. Co., of Augusta, Ga., for 137,000 sq. yds. vitr. brick laid flat on sand and sand fill at $1.54 per sq. yd.; 146,000 lin. ft. granite curb, 44 cts., and grading 35 cts. per cu. yd. J. O. Spencer is City Engr.

Clinton, Ia.—For construction of concrete culvert at Fountain and Exchange Sts., to Thos. Carey & Son, of Clinton, at total bid of $1,606.68. Totals of other bidders: P. C. Donohue, $1,693.06; Miller & Ladehoff, $1,771.61; Marsh Eng. Co., $1,992.67, and A. Stuhlman, $1,997.07; also for concrete culvert at Old Main and Ottawa Sts., to Thos. Carey & Son, at $1,161.48. J. G. Thorne, City Engr.

Clinton, Ia.—For construction of 57,400 sq. ft. sidewalks at 13 cts. per sq. ft., extra grading, 85 cts. per cu. yd., to W. L. J. Cheramy at total bid of $7,717, also 37,500 sq. ft. sidewalks at 13 cts per sq. ft., extra grading 50 cts. per cu. yd., to Fred Bodenhofer, at total bid of $4,965. J. G. Thorne is City Engineer.

Creston, Ia.—Contract has been awarded to E. Kenney & Son, of Creston, for construction of sidewalks at following bid: 49,000 ft. 4-in. concrete walks at 10.75 cts., total $5,267.50; 750 ft. new brick walks at 7 cts., total $52.50; 5,300 ft. repair brick walks at 5 cts., total $265; 2 M. extra for new brick at $6, total $12; 480 ft. 6x12-in. curb at 18 cts., total $86.40; 480 ft. 6-in. areaway walk at 24.5 cts., total $117.60; complete total of bid $5,801. Other bidders were Akin & Flutter, Corning, Ia., $6,417.35; W. E. Rutledge & Co., Creston, $5,893.85.

Morgan City, La.—W. A. Prather, of McDermott, Ark., was successful bidder before City Council for constructing 30,000 yards of cement sidewalks at $32,047.84, or $1.05 per yard. He is allowed seven months to complete contract.

Baltimore, Md.—Seven contractors bid for job of paving 22 streets in South Baltimore with sheet asphalt under specifications of Paving Commission. The American Paving & Construction Co. was lowest on contract with its bid of $1.60 per sq. yd. P. Reddington & Son bid $1.59 for asphalt but offered less for old material and were therefore underbid by American Company. Bids of five other companies were as follows: P. Flanagan & Sons, $1.78; Newton Paving Co., $1.67; Baltimore Asphalt Block & Tile Co., $1.79; Soutnern Paving Co., $1.67; Warner-Quinlan Co., $1.64. The American Paving & Construction Co. is successor to Elder Paving Co. Contract is numbered 73. Similar interest also was manifested in bids for Paving Commission's contract No. 74, embracing streets in North and Northwest Baltimore to be paved with sheet asphalt. Only four contractors bid for this job, and American Paving & Construction Co. was also lowest, with offer of $1.55 per sq. yd. Other bids were as follows: P. Flanagan & Sons, $1.78; Baltimore Asphalt Block & Tile Co., $1.66; Warner-Quinlan Co., $1.78. The price obtained on contract No. 73 is within 8 cts. per sq. yd. of the lowest price ever obtained by the Paving Commission. Upon recommendation of Paving Commission, Board of Awards has formally rejected bids offered for North Howard St. paving and will readvertise contract.

Lynn, Mass.—Purchasing Agent Albert S. Carleton has awarded contract to John L. Goss, of Stonington, Me., to furnish city with granite for curbstone for year 1914.

St. Louis, Mo.—To Ruecking Construction Co., city, at $10,800, for improvement of Wisconsin Ave., Chippewa to Broadway Sts., with brick.

St. Louis Mo.—For brick block alley improvements, by Board of Public Improvements, as follows: To Frank A. Stiers, 4171 West Belle Pl., 8 contracts, total $22,994; Rueching Constr. Co., Marine Ave. and Gasconde St., for alleys in Roselle Ave. and Withnell Ave., $5,092; Eyerman Constr. Co., 1216 S. Grand Ave., for alleys in Delor St. and Nebraska Ave., $2,652.

Albany, N. Y.—State Highway Commission has opened 17 proposals for construction of Trenton-Prospect-Remsen Road, 5.86 miles long. Lowest bid was put in by the Dale Engineering Co. of Utica, $69,977. Other bidders were: Eastover Construction Co. of Utica, $80,596; Betts & Boice of Remsen, $80,963, and the Newport Construction Co. of Herkimer, $73,538. Eighteen proposals were opened for construction of Norwich-Oxford Road in Chenango County, 9.84 miles long. Lowest bid was that of the Pathfinder Construction Co. of Fulton, $165,729. The Newport Construction Co. and the Dale Engineering Co. also put in proposals. Contracts for both roads will be awarded later. Following were bidders and their prices for rebuilding Ardsley-Elmsford Road: Fred. E. Cross & Sons, Yonkers N. Y., $57,588.40; Bridgeport Construction Co., Poughkeepsie, N. Y., $53,964.55; H. B. Sproul, Inc., Peekskill, N. Y., $69,990.80; Grannis & Warley, Ossining, N. Y., $74,056.95. On Road No. 5419 in Allegany County, 1½ miles, repair work, lowest bidder was the firm of MacGuire & Fahey, Hornell, at $41,875.25. The same firm bid low on the Carrollton-Kilbuck Road, No. 5418, Cattaraugus County, about four miles long. Bid was $61,578.30. Low bidders on three contracts in Orleans County were: Holley-Brockport Road, 2½ miles, N. C. Rick, Youngstown, $62,926.38; Albion-Fancher Road, 3¼ miles, Walter C. Rich, Youngstown, $55,709.50; Hartland-Medina, part 2, 6½ miles, Haradine Bros., $76,338. For repairing part 1 of Albany-Schenectady highway, J. W. Davitt of Troy was lowest of eight bidders his figure being $51,510. The Union Paving Co.'s bid was $62,846.60.

Albany, N. Y.—Following are low bids received by State Highway Commissioner: On repair of Batavia-Elba road in Genesee County, H. N. Cowles, of Rochester, was low with bid of $11,339. The Ribstein-Holter Co., of which former Alderman Joseph Ribstein is the head, submitted a bid of $13,341. Other bids were: Harry B. Harrison, East Rochester, $12,877; Schroeder-Hicks Co., Rochester, $13,481; M. W. Wilbur, Rochester, former Division Engineer, $12,841. On repair of Section 1 of Scottsville road, H. N. Cowles was also low, with bid of $23,829.50. Other bids were: M. W. Wilbur, Rochester, $26,174.50; Ribstein-Holder Co., Rochester, $26,982; Harry B. Harrison, East Rochester, $25,935.50; F. J. Mumm Contracting Co., Buffalo, $26,604; Flower City Contracting Co., Rochester, $23,843; Whitmore, Rauber & Vicinus, Rochester, $24,964.50; Clarence Aikenhead, Rochester, $25,578; Schroeder-Hicks Co., Rochester, $26,597.50. J. W. Brennan, of Geneva, was low on the Geneva-Canandaigua repair contract. His bid was $21,078.90. Cowles' bid was $21,500.10. Harry B. Harrison, of East Rochester, bid $22,067.90. H. N. Cowles was low on the repair contract for the Five Corners road repair contract in Orleans, at $14,041. M. W. Wilbur bid $16,574. Ripton & Murphy, of Rochester, were low on contract for building the Virgil-Cortland road in Cortland County with a bid of $55,249.90. The Dale Engineering Co., of Utica, had the low bid on the Holley-Brockport road at $47,514.35. Chambers & Barnes, of Rochester, bid $56,228.90. The Schroeder-Hicks Co. bid $50,671.15. Harradine Brothers of Spencerport, bid $47,750.55; Whitmore, Rauber & Vicinus, $49,248.15; I. M. Ludington, of Rochester, $47,626.40. Harradine Brothers were low on the Cambria-Wright's Corners road, with a bid of $95,446. They were just under two Buffalo contractors. The same Spencerport firm trimmed the Buffalo contractors on the Pekin-Cambria road in Niagara County. Harradine Brothers bid $97,117.40. Buffalo and Medina firms were from $4,000 to $14,000 higher. Thomas Grady, of Rochester, was low on the Niles-Mandana road, in Onondaga, with a bid of $35,584. He was the only Rochester bidder. The Greece Construction Co., of Monroe, submitted a bid on an Oswego County road and so did Thomas Grady, but neither was low. Bids submitted by firms with headquarters in Rochester and surrounding territory were submitted as follows, Harradine Brothers being the only Monroe firm that was low on any of the three roads: Holley-Brockport, Orleans County—Whitmore, Rauber & Vicinus, Rochester, $67,848.35; Rhody & Clawson, Albion, $64,099.80; Chambers & Barnes, Rochester, $70,313.60; E. R. Weed & Son, Holley, $64,924.10; Schroeder-Hicks Construction Co., Rochester, $71,942.60; Harry B. Harrison, East Rochester, $67,389.58; Ribstein-Holder Co., Rochester, $73,415.88; Constantine Construction Co., Buffalo, $67,965.70; S. V. R. Malcolm & Son, Medina, $64,784.60; J. A. Culkin, Owego, $68,000.10; Thomas Hucknall, Albion, $68,282.17; N. C. Rick, Youngstown, $62,926.38. Albion-Fancher, Orleans County—H. M. Cowles, Rochester, $58,762; W. S. Cooper, Albion, $56,850.50; Ribstein-Holder Co., Rochester, $65,071.90; Malcolm & Son, Medina, $59,200.75; Schroeder-Hicks Co., Rochester, $63,345.50; Chambers & Barnes, Rochester, $68,623; Harry B. Harrison, East Rochester, $61,588.50; Walter C. Rich, Youngstown, $55,709.50; Rhody & Clawson, Albion,, $58,418.50; Thomas Hucknall, Albion, $61,475; Constantine Construction Co., Buffalo, $61,997.50; Barrally & Ingersoll, Rochester, $62,070.50. Hartland-Medina, Orleans County—Gruner & Hallenbeck, Harriman, $79,295; Schroeder-Hicks Co., Rochester, $81,050; Harradine Brothers, Spencerport, $76,338; S. V. R. Malcolm & Son, Medina, $80,165; Myers & McWilliams, Pittsford, $77,376.60; Frank I. Foote, Nunda, $84,659.50; Rubstein-Holder Co., Rochester, $87,499.50; Chambers & Barnes, Rochester, $80,299; Harry B. Harrison, East Rochester, $79,900; D. L. Taylor, Medina, $79,407; Thomas Hucknell, Albion, $80,152; Barrally & Ingersoll, Rochester, $79,323.

Brooklyn, N. Y.—By President of Borough of Brooklyn, for street work as follows: To the Borough Asphalt Co., 1301 Metropolitan Ave., Brooklyn, for paving with preliminary asphalt on a 5-in. concrete foundation, a portion of Crown St., at $5,612; to the same company for the same class of work on a portion of Eldert Lane, at $5,932; to Nicholas Sanzo, 1841 3d Ave., Brooklyn,

for grading, curbing and laying sidewalks in a portion of 81st St., at $4,687; to N. Schneiders' Sons Co., 261 79th St., Brooklyn, for curbing and laying sidewalks on a portion of 82d St., at $4,832.

Cincinnati, O.—By Co. Comrs., contract for retaining wall and improving Round Bottom Road, to Theo. Cornuelle, 6506 Center Madisonville, at $9,828, and for improving Mill road, to Henry Westermann, Cincinnati, at $24,207.

Galveston, Tex.—On recommendation of Commissioner Sappington, contract for 2,000 cu. yds. of mudshell to be used in repairing shelled streets was awarded to Hanson's Sons, of Galveston, their bid being 97 cts. per cu. yd. delivered along streets to be repaired.

Houston, Tex.—Ordinances carrying appropriations from street paving bond fund to amount of $207,022 have been passed by City Council ratifying and confirming 12 contracts awarded by former administration for street paving in this city. Following are names of contractors, paving material, appropriation made and street to be improved: Creosoted Wood Block Paving Co., New Orleans, La., wood block, $18,350, Fannin St. from Leeland to McGowan; Texas Bitulithic Co., Dallas, Tex., bitulithic, $28,-310, San Jacinto St. from McGowen to Eagle St.; C. L. Bernay, brick, $9,350, Rusk from Milam to Bagby St.; Eureka Construction Co., Houston, Tex., Texaco asphalt, $19,415, Louisiana from Capitol to Pease; Texas Bitulithic Co., bitulithic, $34,125, Louisiana from Pease to Berry Ave.; Texas Bitulithic Co., bitulithic, $9,-900, Anita Ave. from Main to Baldwin St.; Creosoted Wood Block Paving Co., wood block, $17,912, Travis from Leeland to McGowen Ave.; Texas Bitulithic Co., bitulithic, $14,500, McGowen Ave. from Milam to Albany St.; Texas Bitulithic Co., bitulithic, $14,950, West Alabama Ave. from Main St. to the G. H. & S. A. tracks; Creosoted Wood Block Paving Co., wood block, $15,600, Fannin St., from McKinney Ave. to Leeland Ave.; Texas Bitulithic Co., bitulithic, $13,850, McGowen Ave. from Crawford to Aransas Pass tracks; Ocklander Brothers, of Amarillo, Tex., gravel, $10,760, Leeland from Crawford St. to the Aransas Pass tracks.

Norfolk, Va.—Board of Control awarded U. S. Sands contract for paving Princess Anne Ave. from Hebrew cemetery to Norfolk and Western Railroad crossing, with Belgian block, at 39 cents per sq. yd. The Norfolk Southern Railway Co. has agreed to pay one-half cost of this work.

Centralia, Wash.—The Lewis County Commissioners have let contract for improvement of the National Park Highway from foot of Jackson Hill to Ethel, which is part of main road from Chehalis to Randle. Five hundred thousand feet of planking will be laid at cost of $5.94 a thousand.

Olympia, Wash.—To Quigg Construction Co., Wenatchee, Wash., at $51,732, for construction of Waterfront road, including grading and culverts.

Port Angeles, Wash.—The contract for improving various streets has been awarded to Lewis, Wiley & Morse, Central Bldg., Seattle, at $194,229. Noted Jan. 22.

SEWERAGE

Birmingham, Ala.—City Commissioners have authorized street department to construct portion of wooden sewer about block long at First Ave. and College Station, East Lake, and to repair old sewer there which has rotted away. Work will cost $400 or $500.

Northside, Cal.—Construction of storm drain in northwest section at Glenn Ave. is being considered; estimated cost, $30,000.

Plainville, Conn.—Plainville has for several years been investigating subject of sewer system and for months committee has been securing plans and estimates of cost. They have found that modern filtration system can be put in for around $90,000 and that cost of maintenance would be about $1,500 per year.

Wilmington, Del. — Construction of sewer to Henry Clay is being considered; estimated cost, $40,000.

DeLand, Fla.—J. N. Hazelhurst, of Atlanta, has prepared estimate of cost of installing a sewerage system which will thoroughly drain about 300 acres of the main part of town, carrying off storm water as well as sewerage.

Atlanta, Ga.—Sewer Committee is planning considerable improvements for this year.

Freeport, Ill.—Property owners interested in sanitary sewer for south part of town have voted unanimously in its favor. Estimated cost is $18,828. Distance is 12,380 ft. There will be 8-in. sewer pipes for distance of 9,780 ft.; 16-in. for 1,098 ft., and 12-in. for 1,502 ft. Estimated cost is 79 cts. a lin. ft., which is regarded as low price. Sewer will empty into 15-ft. sewer at Blackhawk and Grand Sts.

Indianapolis, Ind.—Plans have been adopted for rebuilding Fall Creek interceptor across Fall Creek. That part of interceptor which goes across creek was washed out by flood and has never been replaced. As result, much of sanitary sewage from north part of the city has been emptying into Fall Creek instead of being carried to White River. It is estimated that it will cost from $10,000 to $12,000 to rebuild interceptor across creek. Interceptor will be carried across in bed of stream near Senate Ave. Bids for work will be asked soon.

Vincennes, Ind.—City Engineer Harry T. Watts is preparing plans for downtown sewer system.

Vincennes, Ind.—City Engineer Watts has submitted plan for section of down town storm water sewers to be built with First and Sixth Sts. the west and east boundaries and Hart and Vigo St. the north and south boundaries.

Burlington, Ia.—Construction of two new sewers has been authorized, one is west branch of Hawkeye sewer and other is in Bonn's Hollow.

Pittsburg, Kan.—Ordinance has been passed for construction of 8-in. tile sewer lateral in Sewer Lateral District 22, in Main Sewer District 3, in City of Pittsburg, Kansas.

Baltimore, Md.—Board will receive bids asked for by Sewerage Commission on contract for laying cast iron pipe at sewage disposal plant at Back River.

Taunton, Mass.—The order of a $15,000 appropriation for sewer department construction came in favorably recommended and has passed to second reading. It will have to be advertised under charter and will come up on its adoption stage, Feb. 3. Money is to be expended principally on laterals.

Flint, Mich.—Construction of sanitary sewers on West Third St., from Church to Grand Traverse St., and on Lapeer St., from Eighth St. to Ninth St., have been declared necessary public improvements, by Common Council, and city engineer has been instructed to prepare plans and specifications

Grand Rapids, Mich.—Estimates have been asked for construction of sewer in Madison Ave., from Griggs St. to Burton St.

St. Paul, Minn.—No protest has been made on proposed Hamline-Jefferson sewer system and Board of Public Works has adopted favorable report. Its estimated cost is $221,500 and of this amount the city will contribute $97,000.

Omaha, Neb.—City Council has passed ordinances authorizing issuance of $100,-000 sewer bonds and $100,000 intersections bonds for year's work.

Avalon, N. J.—Council has voted to spend $30,000 on sewerage disposal plant.

Elizabeth, N. J.—Ordinance has been adopted for construction of sewer in Fanny St.

Garwood, N. J.—The initial step nas been taken by council to secure sewer facilities.

Perth Ambcy, N. J.—Officials of street department are considering proposition to construct overflow sewer. This would be extended from near intersection of Miller St. and Pearl Place eastward and parallel with Buckingham Ave. sewer into Staten Island Sound.

Perth Amboy, N. J.—Resolution has been adopted for laying of 12-in. pipe sewer in Chapman Ave., to connect with sewer in Stockton St.

Albany, N. Y.—Plans have been approved by Eugene H. Porter for construction of sewage disposal plant to be built in Irondequoit in connection with new Rochester sewage disposal system. This means that Rochester is to have for treatment of sewage the largest Imhof plant in the world.

Binghamton, N. Y.—Only eight months remains for City of Binghamton to comply with agreement it made with State of New York several years ago and have sewage disposal plant in operation in this city on Sept. 1, 1914. It has been estimated that sewage disposal system could be installed in this city for approximately $350,000.

Brooklyn, N. Y.—Public improvements for Brooklyn aggregating a half million or more will be passed on at joint meeting of all local boards except from Bedford district, to be held at Borough Hall. About one-half of improvements slated to come up are sewers and rest paving, etc.

Lockport, N. Y.—Bonds in sum of $1,-400 have been authorized by Common Council on resolution of Aldermen Hoenig and Upson for repair and construction of sewers, curbing and guttering and improvements of streets in vicinity of Big Bridge.

Oswego, N. Y.—City Engineer James F. Flanigan will present report to Common Council on work necessary to complete east side storm sewer system and other estimates of costs for sewer work in various parts of city. Extension of east side sewer will cover about $40,-000, and plans to have special election called within few weeks to have bonds issued for this work.

Waterloo, N. Y.—Resolution has been adopted providing that Village President George F. Bodine be authorized to advertise for sale of $25,000 of village bonds, avails of which are to be used for construction of disposal plant in connection with sanitary system of sewers now under construction in village. Plans for Imhoff tank system, as well as original single plant as prepared by Morrison & Farrington, Inc., engineers, of Syracuse, have been submitted to the Department of Health at Albany, and Conservation Commission, and in both instances approved. The board has decided to dispose of these bonds at public auction, and President Bodine will receive proposals at Municipal Building, on Wednesday, Feb. 11, at 1 o'clock.

Yorkville, N. Y.—Sewer and paving bonds of village of Yorkville have been sold in amount of $2,500 of one and $3,-800 of the other.

Asheville, N. C.—People will vote on Feb. 10 on $50,000 bond issue for laying of sewer mains and installation of water plant.

Coshocton, O.—County Commissioners will indorse construction of sewer system from Adams St. through Coshocton to river as solution of city's problem of caring for copperas and surface water which now is discharged in big ditch.

Erie, Pa.—Ordinance has been passed providing for construction of nine-inch lateral tile sanitary sewer in Elliott Ave., extending from the center of Peach St., east 230 feet.

Youngstown, O.—Ordinance has been passed to sewer and pave Sheby St.

Carlisle, Pa.—Resolution has been adopted suggesting to council extension of sewerage system from Hanover St. to Walnut and to new Lamberton School Building; also some lateral sewers leading to Walnut St. line.

Reading, Pa.—Plans are being considered to install sewage drainage system at county home.

Edgewood, R. I.—The sewerage problem in Edgewood-Pawtucket is being discussed.

Britton, S. D.—Movement is under foot to vote bonds at spring election for purpose of installing system of sewers.

Greeneville, Tenn.—Recently proposition to issue bonds for sewer purposes was voted on by people of Greeneville and carried by large majority. Bonds have been sold and money is deposited in local banks. It is reported that work of digging sewers will begin soon. Money on hand for this purpose is $40,000.

Knoxville, Tenn.—Laying of sewer laterals in tenth ward of Ninth St. will be one of problems confronting city commission during present year. Main sewer that will draw in laterals to be constructed will be completed within next six weeks. This sewer is laid along bank of Third creek from main line of Southern railway to Tennessee river. Maps for construction of proposed laterals have been about completed by engineering force of city.

Houston, Tex.—City Engineer E. E. Sands has practically decided upon location of big storm sewer which will drain Avondale and part of Montrose. It is planned to put this sewer down on Hathaway St., as natural drainage of that section falls on that thoroughfare. This sewer will connect with laterals leading to big Fourth Ward storm sewer, and will afford splendid drainage to that section of South End homes, which embraces Courtlandt, Avondale, Montrose on the east of railroad and part of Fairview.

Houston Heights Tex.—Bond issue of $200,000 for sewers has been placed on its first reading. Bonds will be issued March 1.

Chilton, Wis.—Engineer J. Y. Donahue of Sheboygan is preparing plans for installation of sewerage system and disposal plant, to cost about $30,000.

Racine, Wis.—Resolution has been adopted for construction of sewer in Quincy St. C. A. Ryba is City Clerk.

Racine, Wis.—Resolution has been adopted that Board of Public Works be instructed to prepare plans, specifications and estimate of cost for the construction of public sewers in Barker St., from Lincoln St. to Superior St., and from N. Chatham St. to N. Wisconsin St.

Racine, Wis.—Resolution has been adopted that Board of Public Works be instructed to prepare plans, specifications and estimate of cost for construction of public sewers in 18th and 19th Sts., from Asylum Ave. to Grange Ave., and in Grange Ave. and in Asylum Ave. from 18th St. to 19th St.

Niagara Falls, Ont., Can.—Alderman Cole, chairman of Sewer Committee, will ask City Council to pass resolution favoring construction of trunk sewer along Muddy Run Creek.

CONTRACTS AWARDED.

Berkeley, Cal.—By City Council, for construction of intercepting and storm water sewer system, to T. J. Shea, Los Angeles, at $52,505.

Los Angeles, Cal.—For construction of sewer in Berendo St., from 4th to 6th St., to Mlagenovich & Gillespie, 3920 Wisconsin Ave., Los Angeles, at $14,725.

Pueblo, Colo.—Bids for new sanitary sewer in Mechanic St. have been opened and the contract awarded to P. C. Croll, at 59 cts. per foot.

Galesburg, Ill.—For construction of vitrified pipe sewer in Mulberry St., to Geo. A. Mallory & Co. of Kewanee.

Springfield, Ill.—Board of local improvements let contract to Ridgely & Cool, Ridgely Bank bldg., for constructing 630 lin. ft. 12-in. vitrified pipe sewers and 700 lin. ft. 18-in. sewer in Frank and 14th Sts.

Cuyuna, Minn.—For constructing sewer system, to General Contr. Co. of Minneapolis, at $19,987.

Frazer, Minn.—Lowest bidder for work on Ditch No. 18 is Kohler Contracting Co., of Frazer, at $13,413.21. Other bidders as follows: Jacob Kohler, Cedar Bend, Minn., $13,495.03; Bosworth & Bourgeois, Bemidji, Minn., $15,081.47, and Brown & McGraw, Litchfield, Minn., $15,131.27. J. L. George is County Auditor.

St. Paul, Minn.—To O'Neil & Preston, at $83,400, for construction of proposed Woodlawn-Fairmount sewer system.

Asbury Park, N. J.—To W. K. Fenn & Co., city, at $9,893, for installation of sewer system.

Keyport, N. J.—Bids on laying of sewer lateral connections have been received as follows: William P. Morris, 55 cts. per foot up to six feet in depth; 65 cts. per foot over six feet, and $1 where shoring is needed; John Cadoo, 41 cts. per foot; Charles Giacno, 48 cts. per foot; Patsy Antico, 55 cts. per foot. Motion was made and passed to award contract to Mr. Cadoo.

Mt. Vernon, O.—By Board Public Service, as follows: Treatment plant, to W. H. Ralston, Mt. Vernon, $14,830; trunk sewers to Hager & George, Newark, N. Y., $17,457; and Oak St. sanitary sewer, to A. A. Graham, Mt. Vernon $1,621.

Altoona, Pa.—To Saupp Co., of Altoona, contract, at about $1,000, for constructing sewers in First Ave. and 24th St.

Chester, Pa.—By Commissioners of Upper Darby Township, contract for installation of sewerage system for Fernwood, to Cantrell Construction Co., of Philadelphia. Contract price is $12,000. Work on construction of sewage system will be started as soon as weather will permit. Contract calls for work to be completed in 100 days. Sewage will be dumped into Cobbs Creek and main sewer will run down Baltimore Pike to creek.

Dallas, Tex.—Contracts have been let for laying of sanitary sewer laterals on Browder and on San Jacinto Sts. by City Commissioners. F. A. Eldredge was awarded both contracts, that on Browder from Jackson to Pocahontas, at $467.80, and that on San Jacinto between Germania and Washington, at $353.30.

Dallas, Tex.—On recommendation of J. M. Preston, City Engineer, contract of Dallas Lime & Gravel Co. for laying sanitary sewer on Colorado and Brazos, some 3,700 ft., was increased by $1,005, so as to permit laying of 15-in. instead of 10-in. pipe.

Houston, Tex.—Council has accepted bid of F. D. Horton & Son, of Houston, for construction of sanitary sewer on Houston Ave., from Payne St. to North Main St.

Seattle, Wash.—By Board of Public Works, for sewers in North 65th St., to Dahlstrom & Rodal, at $1,459.10.

WATER SUPPLY

Tucson, Ariz.—Tucson's water improvement bonds have been sold by city council to Southern Arizona Bank and Trust Co. of this city.

Los Angeles, Cal.—Los Angeles plans to develop gigantic municipal power project, involving expenditure of $10,000,000 in Mono county, according to proposals outlined before state board of water power control by attorneys and engineers representing that city. Tunnel, 26 miles long, to carry water from streams tributary to Mono Lake into Owens River valley, where it will be merged with Los Angeles Aqueduct project, is one of most pretentious features of proposed undertaking.

Waterbury, Conn.—City Engineer Robert A. Cairns in his annual report recommends another reservoir.

Winsted, Conn.—Plan is being considered for new reservoir.

Denver, Col.—Notice is given that bids will be received at office, No. 1 Court House, on block of five hundred thousand dollars' ($500,000) worth of "Municipal Water Bonds," out of total of $8,000,000 authorized to be issued. E. Van Cise is President.

Wilmington, Del.—Bond issue of $50,000 will be considered by City Council, proceeds of which will be used by Water Board for installation of water meters.

DeLand, Fla.—City water plant is to be improved by addition of new and modern boilers and pumps.

Columbus, Ga.—Improvements to reservoir are being considered.

Mishawaka, Ind.—Report has been submitted by City Engineer Charles Cole regarding test recently made by both city engineer and superintendent of water works at new pumping station. Embodied in report made by Mr. Cole were suggested that more wells be driven and that reservoir be installed for future use. He also recommended that additional pump be installed at station of 4,000,000 gallons capacity.

Davenport, Ia.—Plans for wing dam four miles long and lock nearly as large as that at Keokuk. to provide slack water navigation over LeClaire rapids, have been announced by United States engineers here. Improvement will cost $1,250,000 and will be started early in spring.

Muscatine, Ia.—The Muscatine and Louisa County boards of supervisors have officially determined not to award contracts for erection of new pumping plant at Port Louisa until Feb. 4.

Canton, Kan.—Test well for city water works is down 90 feet and abundance of water has been struck. It was tested and 30 gallons a minute was pumped out for three hours. City officials think by putting down five or six wells like this it will give them plenty of water.

Lawrence, Kan.—Following investigation and appraisement by city officials of local waterworks, which are at present owned by private corporation, question of municipal ownership will be submitted to people in accordance with resolution passed by city council. Price asked for plant by water company is $195,000. Special election will be held on March 10.

Newton, Kan.—City Commission has adopted recommendation made by Mayor for new force pipe line to pumping plant, also installation of additional pumping engine with capacity of not less than 3,000,000 gallons per day.

Hamilton, Mass.—Committee has reported favorably for installing water supply for town and believed that some arrangement could be made with Beverly and Salem to take water from Wenham Lake.

Mansfield, Mass.—There is movement here to secure new water tower for Mansfield. Proposition is to erect standpipe of larger capacity than one in present use on Foolish hill.

Saginaw, Mich.—Initial steps towards giving Saginaw a consolidated pumping station and new system of waterworks have been taken by council when it authorized engagement of expert to collaborate with city engineering departmnt in preparing new plans and estimates for proposed undertaking.

Saginaw, Mich.—Expert has been employed to secure data on cost of connecting east and west side water systems and building consolidated station and filtration plant.

Columbus, Mont.—Bids to be received for water works system have been postponed from Feb. 2 to Feb. 16. G. A. Westover is Clerk.

Hardin, Mont.—Ordinance authorizing advertising of sale of bonds amounting to $41,600 for construction of municipal waterworks has been passed by Hardin city council. Final plans for construction of plant will be drawn by B. C. Lillis of Billings, the engineer, and contract let.

Long Pine, Neb.—At special election held here for purpose of voting bonds for erection of new standpipe and other improvements in waterworks, bonds carried by big majority.

Omaha, Neb.—Plans of directors of metropolitan water district for extensive improvements are being inspected and passed upon by two consulting engineers, Isham Randolph, of Chicago, and Wynkoop Kierstead, of Kansas City. Improvements, if carried out as planned, may cost over $1,000,000.

Buffalo, N. Y.—It has been practically decided that city will install water-purifying plant on new intake pier. Whether it will be hypo-chlorite or chlorine method is yet to be determined. First, it was stated, will cost about $6,500 to install and about $10,000 a year to maintain. Cost of other method was not given.

East Syracuse, N. Y.—Springs from which 324,745 gallons of water come every 24 hours may be acquired by local Water Commission. If secured this would be adequate addition to water supply that has caused village considerable trouble for past few years. A bacteriological test has been made of water and its purity cannot be questioned. Civil Engineer George E. Higgins, employed by Water Commission, has been ordered to prepare plans, estimated cost and other data which will be used for purchase of springs.

Madison, N. Y.—Water bonds of village of Madison to amount of $14,500 have been sold by Board of Water Commissioners.

North Tonawanda, N. Y.—Board of Public Works has decided to construct 20-inch water main along Main St., from Thompson St. to Wheatfield St.

Rochester, N. Y.—Bids will be advertised within next two weeks for construction of eight miles of city's third water conduit, which it is planned to start this summer. Actual work will begin very shortly, it is thought, now that Common Council has authorized building of conduit. Specifications are now being prepared, and bids will be asked for both cast-iron and riveted steel pipe, as it has not yet been decided what material will be used for third conduit. It will probably be 38 inches in diameter, which is size of second conduit built by city. Decision will be made probably after the figures for construction have been submitted. Ordinance provided for $400,000 for first eight miles.

Rochester, N. Y.—Joint meeting of Finance and Water Works Committees will be held to consider ordinance providing for issuance of city notes in amount of $500,000 to permit construction of new conduit from Hemlock Lake.

Sylvan Beach, N. Y.—Village is to have new and larger water supply. Frank George, of this city, was lowest bidder, and has been awarded contract for construction of system.

Asheville, N. C.—Election will be held in West Asheville on February 10 for voting on $50,000 bond issue for purchase of municipal water plant, and laying of sewer lines in town.

Durham, N. C.—A committee composed of five members of board of aldermen has been appointed to lay plans to allow citizens of Durham to vote on question of municipal ownership of Durham waterworks system.

Eugene, Ore.—Water extension bonds in sum of $100,000 have been ordered sold. Among plans of water board for use of this money is construction of two new reservoirs and construction of certain water mains.

Portland, Ore.—Bids for 5,200 tons of cast-iron pipe of dimensions ranging from 6 to 30 inches, 600,000 pounds of cast-iron specials and several hundred gate valves have been opened by Commisisoner Daly, of Department of Public Utilities, and referred to Engineer Clarke, of Water Bureau, for tabulation.

Clearfield, Pa.—The Clearfield Water Co. has announced its intention to have meters installed to measure amount of water used by all consumers in future.

Warwick, R. I.—Committee of six has been appointed by Warwick Town Council to consider advisability of securing water supply for town. Council was directed to take this step by taxpayers on Nov. 18.

Fort Mill, S. C.—Committee has been appointed to circulate petition among freeholders calling for election for purpose of issuing $15,000 in bonds to cover installation of water works system.

Huron, S. D.—At special election called for purpose, bonds in sum of $22,000 were voted here to secure site for and for construction of filtration plant.

Jackson, Tenn.—Bonds in sum of $35,000 have been voted for waterworks. This fund will be used in laying another main and putting in more fire plugs and making other improvements deemed necessary at this time.

Seguin, Tex.—City Council has ordered that election be called for February 19 to determine whether this city shall issue bonds in sum of $20,000, of which $7,500 will be used in taking up original water works bonds and $12,500 to make permanent improvements on water and electric light plants owned by city.

Racine, Wis.—Resolution has been adopted for construction of water mains in Grange Ave., 20th St. and Quincy Ave.

CONTRACTS AWARDED.

Williamsburg, Colo.—Bids received from Fox & Smith, of Florence, Colo., for construction of water works, at about $20,363, has been recommended for acceptance. J. S. Schwartz, of Colorado Springs, bid about $23,795. W. E. Westwood is Town Clk.

Chicago, Ill.—For furnishing city with cast-iron pipe, 5,250 tons, at pipe yards, to Glamorgan Pipe & Foundry Co., Lynchburg, Va., at $119,250.

Oak Park, Ill.—Board of local improvements let contract for furnishing and laying lead water service pipes, including brass taps and stop cocks and spiral cast iron shut-off boxes in Wesley, Euclid and Clarence Aves., to Jas. J. Renn, 3820 Herndon St., Chicago, at the following prices: $762.50, $637.50 and $850, respectively.

Lynn, Mass.—Purchasing Agent Albert S. Carleton has awarded contract to the Rideout, Chandler & Joyce Co. of Boston to furnish six and eight-inch mains for Walnut St. pumping station district for $537.75.

St. Paul, Minn.—By Bd. of Water Commissioners, as follows: To American Cast Iron Pipe Co., Birmingham, Ala., 1,500 tons 4 to 20-in. pipe, $24.75 per ton, and 50 tons specials, $47.50 per ton. To Lynchburg Foundry Co., Lynchburg, Va., for 2,000 tons 30-in. pipe, $24.85 per ton, and large specials, $55 per ton.

Scottsbluff, Neb.—For construction of water system according to plans prepared by Yoder & Liljonstolpe, Consulting Engineers, to Gordon-Taylor Construction Co., Denver, Col., at $12,680.

Manchester, N. H.—Contractors Bowes and Ablett of Cohoes have secured large contract in Manchester. Contract consists of 18 miles of water system and two large reservoirs.

New York, N. Y.—For furnishing and installing new water service pipes, valves, etc., at College of City of New York, to National Plumbing Co., 1533 Second Ave., at $1,473.

Franklin, Pa.—For new boiler at city water works pumping station to Oil City Boiler Works on its bid of $1,425.

Fort Worth, Tex.—Hedges Construction Co., of Springfield, Mo., has contract for building conduit line connecting West Fork dam with Holly plant of city water works.

LIGHTING AND POWER

Gadsden, Ala.—Establishment of municipal lighting plant is being discussed.

Tempe, Ariz.—A petition purposing to bring about bond election on municipal ownership of electric lighting and power system of Tempe, is being circulated among citizens and taxpayers of Tempe district.

Springfield, Ill.—By majority of 668 the municipally owned plant amalgamation plan has won with total vote of 11,148. Primarily, election was held to determine whether or not $20,000 electric generator shall be placed in water works plant, but real campaign issue was whether municipally owned downtown city light plant should be combined with city's water works plant at river.

Sterling, Ill.—At meeting of Board of Local Improvements, following public hearing on the proposed system of boulevard lights, members of board reaffirmed their previous action and proposed improvement will be submitted to people and Council according to law. Said boulevard light system contemplates preparation of fireproof room in basement of city hall for housing of transformers and switchboards and controlling and protective apparatus; the installation of apparatus for transforming regulating and controlling the current used for said boulevard lighting system and protecting same; installation of 82 single light or steel lighting posts with globe holders, to be located on said street as shown upon plans for same; installation of about 8,600 ft. of twin solid conductor rubber insulated, lead encased, jute wound, steel ribbon armored, park and suburban cable and single conductor of same material, and about 1,025 ft. of rubber insulated, triple braid, duplex strand conductor for use in lamp posts; furnishings and placing in position on each post one series Tungsten 6.6 ampere 250 watt lamp with 1½ inch skirted base, with efficiency of 1 candle power per watt, or, if possible to procure them before system is operated one series nitrogen Tungsten 6.6 ampere lamp, 250 watt, with efficiency of not less than .7 watts to candle power, and contemplates enclosing said lights in ball shade 16 ins. in diameter, with 8-in. neck, constructed of glass.

Troy, Ind.—Town of Troy, five miles distant from here, is to have electric light plant. Town Board has granted a franchise to DeHaven & McIntyre, of Hardinsburg, Ky., to install plant for street and house illumination.

Denison, Ia.—Voters of Denison have decided by large majority to own light plant at this city. By similar vote council was authorized to issue bonds not to exceed $65,000 to buy present plant or install new one. Plan is to mutually agree on price for buying plant now in operation.

Red Oak, Ia.—New lighting contract has been made by City Council with Red Oak Electric Co. by which city will receive 300 per cent. more light than it is now receiving, at cost of $4,000 per year.

Hyattsville, Md.—At January meeting of Mayor and Common Council, a committee, of which Mayor Shepherd is chairman ex officio, was named to investigate and report upon probable cost of installing municipal electric lighting plant in Hyattsville.

Durand, Mich.—Board of electric light commissioners will purchase within next few months one 125-kva to 177-kva, three-phase, 60-cycle, 1100/2200-volt generator, directly connected to four-valve non-releasing Corliss engine, and from 18 to 22 lamp-posts for five-lamp clusters (center lamp vertical and four lamps inverted). H. F. Rosenkrans is Superintendent.

East Lansing, Mich.—Plans are under consideration for installation of new municipal street lighting system.

St. Paul, Minn.—Consulting Engineer Adolph F. Meyer reports public light costs may be decreased by water power development at government high dam. New machinery is also recommended.

St. Paul, Minn.—Dean Francis C. Shenehon of University of Minnesota has submitted to Mayor Keller report on feasibility of power development at high dam by Municipal Electric Co. for supplying of electric current to cities of St. Paul and Minneapolis and University of Minnesota. Report was prepared by Adolph Meyer, consulting engineer, and determines amount of water power available, and estimates cost of construction and operation of hydro-electric machinery capable of developing about 15,200 horsepower, or 10,500 kilowatt capacity. It is proposed to analyze report and submit it to Congress next month.

Glendive, Mont.—City Council has passed ordinance authorizing installation of arc-lamp lighting system on Merrill Ave., to cost about $5,000.

Auburn, Neb.—City is planning installation of ornamental street-lighting system in spring. Plans call for 65 ornamental posts. G. E. Johnson, of Falls City, is engineer.

Hammonton, N. J.—Hammonton Council has before it number of petitions requesting additional street lighting.

Spring Lake, N. J.—Councilmen have under contemplation establishment of municipal lighting plant.

Dunkirk, N. Y.—Petitions to mayor, common council and water commissioners asking that cluster light system be installed in business section of city are being numerously signed by citizens and taxpayers.

Niagara Falls, N. Y.—Petition from property owners in Tenth St. between Lockport St. and North Ave., asking that all wires on street be placed in conduits before street is paved, has led Board of Public Works to adopt resolution that city engineer and city electrician visit Erie, Pa., before next meeting of Board and make report upon municipal conduits maintained in that city.

Wilmington, N. C.—Councilman C. C. Loughlin, in charge of Water and Sewerage Department, has given out figures of estimates as to what it would cost city to install and operate municipal lighting plant, prepared by Mr. Raymond Hunt, superintendent of electrical department of Tidewater Power Company. According to figures of Mr. Hunt, initial cost of installing power plant at city waterworks plant would be $64,364.26, and annual cost of maintenance would be $29,321.74, which is $11,571.74 more than it would cost city for street lighting if one of propositions made by Tidewater Power Company was accepted.

Dayton, O.—Efforts of public-spirited residents of Wayne Ave. to secure boulevard lights, much needed along street, are materializing in voluminous petitions for lights.

Ford City, Pa.—Should plans now contemplated by Ford City's Council be carried out borough will have new and up-to-date electric light plant in near future. It has about been decided to purchase turbine driven engine, two units and of 300 kilowatt capacity. This engine with motors, machinery and other appurtenances, including even buildings, will cost borough about $34,000. It is planned to build new electric light and power plant near municipal water plant.

New Castle, Pa.—Commissioner Ramsay has presented a resolution to Council requesting Harmony Light Co. to produce bid or bids for lighting city streets and furnish commercial light for city, in writing.

Newport, R. I.—Better lighting of Thames St. is being discussed.

Woonsocket, R. I.—Mayor Daignault has signed resolutions providing for additional street lights.

Jasper, Tenn.—Work will begin within few days in matter of wiring Jasper for electric lights and power from lock and dam at Hale's Bar. It is stated that substation will be located here.

Jackson, Tenn.—Bonds in sum of $25,000 have been voted for electric light plant.

Pecos, Tex.—City Council of Pecos has decided to light business section of town, extending system to include residence portion as far as churches. Ornamental posts have been ordered, and appropriation of $750 has been made for first cost.

Sedro-Woolley, Wash.—Plans for installation of cluster-lamp lighting system on Metcalf St., from State St. to the Great Western crossing, have been approved by City Council. Estimated cost, $25,000. Electricity will be furnished by the Pacific Northwest Trac. Co., of Sedro-Woolley.

Milwaukee, Wis.—City Council is considering installation of new street lamps in outlying districts, which will cost about $16,000. Resolution has been recommended to Council finance committee which favors appropriation of $5,000 to provide funds for survey of city for new electric-lighting system.

CONTRACTS AWARDED.

Tucson, Ariz.—City Council of Tucson has awarded to Griffith & Pacheco contract for construction of conduits on Congress St. that are designed to carry wires for ornamental lighting system. There were five bids on work, as follows: Bane & Tarant, of Phoenix, $3,920; C. H. Waggoner, $3,949; Griffith & Pacheco, $3,896.80; N. E. Carter, of El Paso, $3,850, and Southwestern Electric Co., $3,850.

Indianapolis, Ind.—Contract for electric light fixtures for new fire headquarters building at Alabama and New York Sts. has been awarded by board of public works to F. H. Cheyne company. Contract price is $192 and is $20 higher than lowest bid. Board accepted bid of the Cheyne company, however, as company can install fixtures immediately.

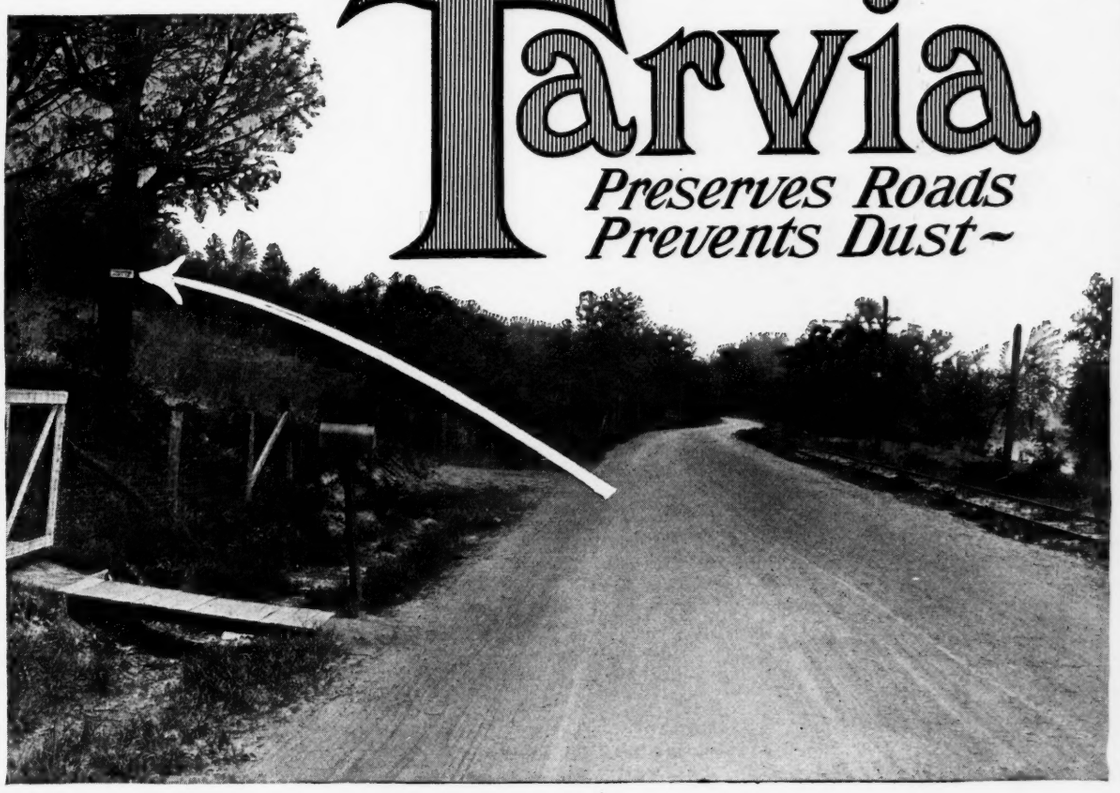
Holyoke, Mass.—For 4,000-kw. turbine for municipal light plant, to Westinghouse Co., Pittsburgh, Pa., at $35,000, and for condenser, to Deane Steam Pump Co., New York, at $11,000.

Marion, O.—To Sun Vapor Street Lighting Co., of Canton, for lighting of court house esplanade.

Camden, S. C.—By commissioners of public works contracts for building new and up-to-date water and electric light plant. Some time ago bonds to amount of $125,000 were issued and these were recently sold. Contract was awarded to Tucker and Laxton, of Charlotte, N. C., for general construction at $61,976. There will be 215 lamps of 100 candle power each, suspended over streets about 200 feet apart. Lamps are of Nitrogen Tungsten type and this will be one of first installations of this type of lamp in this country. In main part

Tarvia

Preserves Roads
Prevents Dust~



River Road, West Lafayette, Indiana. Constructed with "Tarvia X". Photographed two months after the flood.

This road was 10 feet under water

The roadway illustrated above runs along the banks of the Wabash River at West Lafayette, Indiana.

In March, 1913, the great floods raised the river to the white mark on the tree at the left of the picture, completely submerging the macadam roadway.

This stretch of road was constructed in 1911 with "Tarvia X", and the condition of the highway after the flood gives ample demonstration of the fact that a Tarvia-bonded roadway is waterproof.

Tarviated macadam sheds an ordinary rainstorm immediately. Water does not percolate into the surface or loosen the Tarvia bond.

In this instance, the road got more than an ordinary wetting but after the waters receded the macadam was found still in excellent condition, unchanged in contour, and ready for traffic without any attention or repairs.

"Tarvia X" is a dense, viscid, coal tar compound of great adhesive power and immune from damage by water or weather. Used as a binder, it so increases the strength of the macadam as to make it automobile-proof and erosion-proof. The saving in maintenance expense and the prolongation of the life of the road more than balance the cost of the Tarvia treatment.

Booklets on Request.

BARRETT MANUFACTURING COMPANY

New York Chicago Philadelphia Boston St. Louis Kansas City Cleveland
Cincinnati Minneapolis Pittsburgh Seattle Birmingham

THE PATERSON MFG. CO., Ltd.:—Montreal, Toronto, Winnipeg, Vancouver, St. John, N. B., Halifax, N. S., Sydney, N. S.

of town there will be white way of Doric clusters on each side of street.

St. George, S. C.—By City Council contract for installation of electric light plant and wateworks system to Modern Equipment Co., of Savannah.

Seattle, Wash.—For installation of cluster lamps on 5th Ave., to Dicken & Rightmire, 2738 33d Ave., Seattle, at $12,279.

Seattle, Wash.—By Board of Public Works for 57,096 lbs. of weatherproof feeder cable to Pierson-Roeding Co., at $12,960.79, and for 5,200 ft. of rubber-insulated lead-sheathed cable to Standard Underground Cable Co. of New York City at $4,009.20.

FIRE EQUIPMENT

Fort Smith, Ark.—The fire department is to be equipped with combination pump and hose wagon, auto-drawn, and 2,000 ft. of hose, as soon as purchase can be made and equipment delivered by makers.

Bridgeport, Conn.—With money it is expected will be received from Board of Apportionment, members of Board of Fire Commissioners plan to purchase motor tractors which will be used to draw hook and ladder apparatus and other pieces in department, which are not motor drawn. At least $8,000 is expected in appropriation.

Stafford Springs, Conn.—Installation of modern fire alarm system is recommended.

Key West, Fla.—City Council has decided to buy motor fire engine with a capacity of 700 gallons of water a minute. Engine to be arranged to carry hose. Bids for apparatus will be received until February 24.

Macon, Ga.—City will sell before City Hall on Feb. 3 to highest bidders one Hayes aerial ladder truck, one Seagrave service truck, one Holloway double 60-gal. chemical engine, one two-horse hose wagon.

Jacksonville, Ill.—Council will spend $1,000 for purchase of hose and other equipment.

Oelwein, Ia.—Council is considering motor apparatus. A combination chemical and hose cart may be purchased.

New Orleans, La.—Bids for furnishing one motor-propelled and motor-power engine of 1,500 gallons per minute pumping capacity, one 55-foot water tower and one motor-driven double 60-gallon tank chemical engine have been opened by Deputy Commissioner of Finance F. J. White. Bidders were the Morton Carriage Works, the Seagrave Company, Robinson Fire Apparatus Manufacturing Company, International Motor Company, Enterprise Electric Company, Ahrens-Fox Fire Engine Company, White Company, Knott Fire Engine Company and the G. F. Spence's Sales Company. Bids were referred to commissioner of public safety and committee on supplies of Fire Department.

Cliftondale, Mass.—Purchase of auto pump engine with capacity of 700 gallons per minute, equipped with 50-gal. chemical tank and 300 ft. of chemical hose, is petitioned for.

Waltham, Mass.—Motor equipment for at least part of Elgin Fire Department is being considered. Commissioner Kohn is in favor of city issuing bonds to purchase new fire and police equipment, and erecting an incinerator. He estimates that between $3,500 and $4,000 would give necessary equipment for fire department.

Westboro, Mass.—Board of Fire Engineers has recommended purchase of motor combination chemical and hose wagon and installation of a new alarm system. Thomas H. Treadway is Chief.

Duluth, Minn.—Among important recommendations made by Chief Randall for current year are: A new site and a new house at West Duluth; a fire tug; a new aerial truck to replace the old one; a combination hose and chemical motor rig to replace No. 2 hose wagon; two motor tractors to propel engines No. 1 and No. 2; a city service motor-driven hook and ladder truck; 3,000 ft. of new 2½-in. hose; a new automobile for the fire chief.

Joplin, Mo.—Bids will be asked immediately for motor combination chemical and hose wagon.

Manchester, N. H.—Appropriation of $30,000 has been recommended for motorization of fire department.

New Brunswick, N. J.—Chief Harry J. Francis has recommended purchase of 3,000 ft. of hose, one 35-gallon chemical tank, one gasoline storage tank for motor apparatus, one three-way deluge set, and one 9-ft. life net.

Perth Amboy, N. J.—Purchase of new hose-carrying apparatus for McClellan Engine Company is being discussed.

Trenton, N. J.—Commissioner La Barre will recommend to City Commission purchase of two tractors, one for use of No. 2 and the other at No. 3 Engine Houses on South Broad St.

Little Falls, N. Y.—Purchase of new auto fire truck has been recommended.

Patchogue, L. I., N. Y.—Members of Patchogue Fire Department are working to secure motor trucks, and are circulating petitions asking village board to submit to taxpayers question as to whether or not they will raise money with which to purchase them. There are three propositions, one calling for $2,500 for one motor hose wagon, another for $5,000 for two motor hose wagons, and still another for $3,500 asking for purchase of motor tractor to attach to hook and ladder truck.

Plattsburg, N. Y.—Chief Glenn C. Merrihew has recommended in annual report establishment of new company and purchase of motor triple-combination wagon, one hose wagon capable of carrying 1,000 feet of hose, one life net and 18 rubber suits; he has also recommended alarm system be rebuilt and 10 boxes added.

Rochester, N. Y.—Clerk Pifer has been instructed to advertise for bids for furnishing 2,000 feet of hose for street department. Hose will be used in street and sewer flushing.

Utica, N. Y.—Erection of new fire station in southern section of city is being considered.

Watertown, N. Y.—Purchase of 3,000 ft. of hose and auto for assistant chief, also that motor apparatus now in use be equipped with heavier tires, have been recommended by Chief H. C. Bundy.

Charlotte, N. C.—Executive Board recommends appropriation of $11,000 for purchase of additional equipment for fire department.

Akron, O.—Council will pass bond ordinance for $65,000 to purchase McCue property, on South Broadway, and erect new cental fire station.

Chester, Pa.—Chief Slater recommends that Good Will Fire Company be equipped with new engine, and he states that this company would like to have combination engine and hose carriage. He also recommends that Felton Fire Company be equipped with combination hose and chemical wagon, and that wagon now in use by that company be utilized as fuel wagon, and that it be kept for emergency purposes in central part of city. He also advises that all old apparatus be put in good condition for future use, and that universal coupling be used, instead of two different designs of coupling as at present.

Doylestown, Pa.— Two fire-fighting machines, one auto chemical apparatus, and an auto pumping machine will be purchased by Doylestown Fire Company.

Gilbertsville, Pa.—The Gilbertsville Fire Company has started a movement to purchase new fire apparatus at cost of $700.

Meadville, Pa.—Resolution has been adopted to advertise for bids for furnishing motor-driven combination hose and ladder truck, together with a tractor for old chemical wagon.

Newhope, Pa.—Fire Committee has been ordered to purchase 300 ft. of hose.

Pottstown, Pa.—The Philadelphia Fire Co., of Pottstown, will conduct a one month's campaign to raise $8,000 for auto apparatus.

Spangler, Pa.—Borough is in the market for 250 ft. of 2½-in. fire hose. Wants samples to submit to Council at meeting on February 11. Geo. W. Lantzy, Borough Clerk.

Wilkes-Barre, Pa.—Erection of new fire house and purchase of motor-driven combination wagon and motor-driven engine are being planned.

Charleston, S. C.—Chief Behrens has recommended following improvements: Purchase of one motor triple combination pump of 750 gallons capacity, chemical and hose truck for Engine House No. 6, on Cannon St.; also purchase of new motor 75-ft. aerial hook and ladder truck to take place of old truck. He also advocates buying of Morse invincible nozzle of 1,100 gallons capacity to be added to one of fire tugs.

Nashville, Tenn. — Following ordinances have been passed on final reading: Appropriating $8,500 for purchase of motor fire engine, $1,250 for purchasing property in Eastland for fire hall, $7,000 for erecting fire hall, and $2,000 for purchasing fire hose.

Houston Heights, Tex.—Ordinance authorizing issuance of $20,000 for fire station was placed on its first reading. These bonds will be issued March 1.

Victoria, Tex.—Question of erection of central fire station and securing of automobile trucks for department is being discussed.

CONTRACTS AWARDED.

Rutherford, N. J.—To M. Donahue & Sons, of New York, and Voorhies Rubber Co., of Jersey City, contract for 500 feet of hose.

Oneida, N. Y.—To Combination Ladder Co., of Providence, R. I., for one steam fire engine.

Charlotte, N. C.—Board of Aldermen has instructed Executive Board to execute contract for purchase of an American-La France automobile pump, type 12, and installation of pump on type 10 now owned by the city, cost of the whole to be $10,500.

Ogden, Utah.—Purchase of combination motor pump and chemical for the fire department at cost of $9,000 has been authorized by city commissioners. Immediately afterward contract was signed by Recorder George Seaman and N. P. Cornell of American-La France Fire Engine company, whereby new apparatus is to be delivered within a few months.

Cedarburg, Wis.—To Howe Engine Co., of Indianapolis, Ind., contract for a 50 h. p. gasoline fire engine, with pumping capacity of 400 gals. per minute, at $1,600.

BRIDGES

Leesburg, Ala.—Effort is being made to bridge Coosa River.

Jacksonville, Fla.—Resolutions have been adopted for presentation to City Council recommending providing of 22-foot clearance in construction of new permanent Duval St. viaduct.

Americus, Ga.—Building of bridges over Muckalee Creek has been authorized.

Huntington, Ind.—A call for County Council to meet has been issued by Harold Guthrie, County Auditor. Purpose of meeting will be to reappropriate unexpended appropriations for bridges and other things.

Manhattan, Kan.—Five concrete bridges will be built in Harvey County soon under latest improved type under direction of State Highway Engineer W. S. Gearhart, of the Kansas Agricultural College.

Grand Haven, Mich.—Plans for rebuilding Spring Lake bridge over Grand River have been accepted by City Council. Rumsey & Works, Grand Rapids, Mich., are engineers.

Manchester, N. H.—Appropriation of $5,000 has been recommended for erection of bridge over Portsmouth tracks between Baker and Shasta Sts.

Trenton, N. J.—Ex-Senator J. A. C. Johnson of Bergen County, counsel to New Jersey Interstate Bridge and Tunnel Commission, has said that it would cost $42,000,000 to build bridge across Hudson at 57th St., New York City, while cost of two tubes under river from Jersey City to lower Manhattan would be only $11,000,000.

Brooklyn, N. Y.—Public Service Commission has approved agreement entered into between Long Island Railroad Co. and New York Consolidated Railroad Co. for construction, at their joint expense, of new highway bridge to carry Eighth Ave., Brooklyn, over tracks of those railroads between 31st and 62d Sts. Commission has also authorized companies to let contract for construction of bridge to Parsons & Lantry, the lowest bidders, for $46,257.20.

Brooklyn, N. Y.—Plans are being discussed for reconstruction of old Brooklyn Bridge.

Owasco, N. Y.—A meeting of Town Board of Owasco will be held on Feb. 10 to take action on project of building bridge from the Swift St. extension across Owasco outlet to Melrose district of town of Owasco.

Youngstown, O. — General improvements committee of council has recommended adoption of compromise plan for new East End bridge. They further recommended that structure be not less than 70 feet wide. Total cost of this plan is estimated by Engineer Lillie to be about $200,000, city's portion amounting to about $40,000. Question is now up to council where final decision is to be made.

Youngstown, O.—Plans have been filed for proposed bridge over Lincoln Park from Rigby St. to McCartney Rd. About $30,000 is available.

Chattanooga, Tenn.—County Court has passed resolution authorizing issuance of $100,000 in bonds for repair of Walnut St. bridge.